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Teachers' Competence and Challenges in Implementing ICT-Based Instruction: Basis for a Training Design

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Abstract

This study evaluated the teachers' competence and motivation in implementing ICT-based instruction in East Butuan District 1 and identified challenges as a basis for developing a context-specific ICT training design. The study assessed competence in terms of social influence, performance expectancy, effort expectancy, and facilitating conditions, while measuring motivation through autonomy, competence, and relatedness. The research further examined the relationship between competence and motivation and identified barriers to effective ICT integration in classroom instruction. A descriptive-correlational research design was employed, involving 113 teachers from schools with internet connectivity. Data analysis established levels of competence and motivation, significant relationships among variables, and barriers to ICT implementation. Findings revealed that teachers demonstrated a very competent level in social influence and performance expectancy, with effort expectancy and facilitating conditions rated as competent as well. Teachers were motivated to integrate ICT across all measured dimensions. Performance expectancy, effort expectancy, and facilitating conditions were significantly related to motivation, whereas social influence was not. Major challenges included limited ICT resources, insufficient training, technical issues, time constraints, and inadequate internet connectivity. Consequently, a context-specific ICT training design was proposed, emphasizing hands-on workshops, practical application, ongoing technical support, and sustained professional development to enhance teachers' digital competence and promote effective ICT-based instruction.

Keywords: ICT-based instruction, teacher competence, teacher motivation, digital integration, ICT challenges, training design

Introduction

The rapid advancement of digital technologies has brought significant changes to education, influencing teachers' performance, instructional approaches, and professional responsibilities. The increasing use of technology in education has enabled teachers to improve lesson delivery, develop innovative learning materials, access diverse educational resources, and create more engaging learning experiences for students. Through effective utilization of digital tools, teachers can enhance classroom management, support

differentiated instruction, and promote learner-centered teaching practices. However, the extent to which technology improves teachers' performance depends on their competence, motivation, confidence, and ability to integrate digital resources meaningfully into instructional processes.

Technology-supported instruction is now a vital part of teaching and learning worldwide. Teachers are expected to continually develop their digital competence to meet evolving learner needs and the demands of a technology-driven society. International organizations highlight that teachers' proficiency with digital technologies enhances instructional quality, increases access to learning, and supports the development of twenty-first-century skills among students (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2023; Organisation for Economic Co-operation and Development [OECD], 2021).

The Department of Education (DepEd) has introduced policies and programs to strengthen technology integration and support digital learning environments. Initiatives such as the DepEd Digital Rise Program and the MATATAG Agenda focus on enhancing digital infrastructure, improving connectivity, and building teachers' technological skills (Department of Education, 2020, 2022, 2023). These programs acknowledge that successful technology integration depends not only on resource availability but also on teachers' preparedness, confidence, and ability to use technology effectively in instruction. Teachers remain central to ensuring technology leads to improved teaching and meaningful learning outcomes.

Despite these efforts, teachers still face challenges in implementing technology-based instruction, especially in designing interactive, learner-centered experiences aligned with curriculum standards. In East Butuan District 1, educators need to develop their digital skills further, apply effective technology-based strategies, and address barriers to classroom implementation. Variations in teachers' skills, motivation, access to resources, and professional development can affect the success of technology integration. Understanding these factors is essential for developing interventions that meet teachers' needs and improve technology-supported instruction.

This study examines teachers' technology integration practices across three key areas: competence, motivation, and challenges in technology-based instruction. Competence refers to teachers' knowledge and ability to use digital tools, while motivation covers their willingness, confidence, and readiness to incorporate technology into teaching. The study also identifies challenges that may limit the effective use of technology in instruction. The findings aim to inform the development of training design that strengthens teachers' digital skills, enhances instructional effectiveness, and supports sustainable technology-enhanced learning environments.

Review Studies

This section presents and discusses the relevant literature and studies that the researcher considered to strengthen the significance of the present study. It also synthesizes these scholarly works and highlights their relevance to the current research.

Teachers' professionalism in ICT-based education has become a core topic in the digitalization era, where ICT increasingly mediates teaching and learning. ICT competence includes technical knowledge, pedagogical skills, and the ability to integrate technology comfortably to improve student outcomes. Individual and contextual factors such as social influence, institutional support, resource availability, and professional collaboration shape an individual's ICT competence.

Ling et al. (2024) emphasize the moderating influence of social groups and technological adoption, illustrating the complexity of decision-making. This review highlights the importance of viewing subjective norms as key to predicting and shaping consumer behavior, with significant implications for creating more targeted and effective marketing strategies. Rasdiana et al. (2024) also said that culture is crucial for ensuring the effectiveness of the collaborative learning process that meets the needs of students in this digital-savvy

era. Aithal & Aithal (2023) also emphasized that, in an era of rapid technological change and shifting educational paradigms, this research aims to identify effective tactics and approaches that enable educators to flourish as mentors, teachers, and researchers. This research seeks to provide important insights that will help educational institutions improve the quality of teaching, learning, and research, thereby fostering a more robust and responsive educational ecosystem. It does so by examining global trends, synthesizing postulates, and offering practical suggestions. Meanwhile, Hussain et al. (2025) observed that leadership practices, institutional culture, and resource constraints shape these pathways. They noted that monitoring is particularly effective when used for formative purposes. Digital and hybrid mentoring models, which combine peer collaboration, expert guidance, and online platforms, have proven especially beneficial for maintaining engagement and promoting pedagogical innovation in difficult circumstances.

On the other hand, Poh & Lee (2025) suggest that although performance expectancy has little impact on self-efficacy, factors like effort expectancy, social influence, and facilitating conditions do contribute to it. Additionally, the positive link between self-efficacy and the intention to use ClassIn highlights the importance of self-efficacy in adopting and consistently using educational technology

Kiryakova & Kozhuharova (2024) show that teachers actively use digital technologies in their daily teaching activities (84.8%) in order to create and provide learning content to students and to provoke their active participation, and is a convenient tool for evaluating their students' knowledge and skills and for providing effective feedback. In addition, Ke & Gong (2025) emphasize that as technology becomes vital in language education, it is crucial to understand how pre-service teachers build confidence in using technology for effective teacher training.

Runge et al. (2023) emphasized that teachers' beliefs about their competence are essential for determining instructional quality. Nonetheless, research focusing on competence-related beliefs in the context of technology-enhanced teaching, particularly regarding the different dimensions of competence and their connection to instructional quality, remains limited. The findings supported a bifactor model in which a general factor, defined as empowering learners, coexists with two subdimensions: differentiation and active learner engagement. Teachers' beliefs about differentiation and empowering learners are positively linked to their reported use of technology to improve instructional quality. Understanding how teachers' beliefs about empowering learners are structured and how they relate to instructional quality in technology-based teaching is important for teacher education, aiming to meet diverse student needs and foster active, creative learning.

Oyetade et al. (2024) noted that organizations now increasingly rely on effective ICT adoption to sustain growth in a competitive global environment. Yet, research on the internal factors affecting successful ICT implementation, especially through case studies, remains scarce. This study aims to fill that gap by examining internal factors such as organizational culture, leadership styles, employee attitudes, resource availability, user perceptions, and peer influence that influence ICT adoption and align with strategic goals. The results extend existing models like Innovation Diffusion Theory (IDT) and Technology Acceptance Model (TAM) by applying them within internal organizational contexts, highlighting the importance of leadership, culture, and resources. Practically, the study offers recommendations for fostering an ICT-driven culture, aligning technology initiatives with strategic objectives, and investing in infrastructure to overcome barriers and promote sustainable technological growth in a globalized world.

The literature frequently finds that social influence plays an important role in teachers' ICT competence. Educators are more likely to adopt technology when peers, school supervisors, professional communities, and other key stakeholders promote or even require its use (Al-zboon et al., 2021; Chroustová et al., 2022; Masmali & Alghamdi, 2021). As (Ahmad, Mahboobeh et al. 2023) and (Jamil & Khurshid, 2024) posit, having such a school culture that focuses on digital literacy creates teacher expectations for technology integration, which in turn signals that competence is more about the social than the individual. Peer encouragement and mentorship can complement this, as teachers are more willing to improve their

competence when they see colleagues using ICT effectively alongside guidance (Sanchez et al., 2023; Veiga & Andrade, 2021). Therefore, professional learning communities are pivotal to sustaining effective ICT use.

Performance expectancy (i.e., teachers' perception that ICT will improve teaching performance and enhance student outcomes) has a sustained effect on adoption rates. In general, teachers who view technology as valuable for pursuing pedagogical aims show stronger commitment to exploring and using digital tools (Chroustová et al., 2022; Farisa et al., 2023; Veiga & Andrade, 2021). On the other hand, perceived effort expectancy, the perceived ease of use of ICT, has an inverse effect on teachers' intention to accept the new tools. Computer anxiety, caused by complex interfaces and inadequate platforms and training for practitioners, could lead to low integration rates (Al-zboon et al., 2021; Jamil et al., 2024). Research recommends designing tools that are easy to use and offering practical, hands-on training to help build confidence and competence.

Support for ICT-based instruction is dependent on structural and organizational factors. Enabling conditions (e.g., access to hardware and software, internet access, and technical support) facilitate teachers' implementation of ICT (Al-zboon et al., 2021; Kahnbach et al., 2024), while institutional conditions (e.g., leadership and alignment of policies with practice and organizational culture) also shape competence. Clear directives and specific training, with leaders' presence, also substantially increase teachers' ICT utilization (Alberto et al., 2024; Lee, 2023; Lawrence, 2022). These fifteen principles emerge in a context that is all too real on many campuses today, with hybrid and online instruction, along with robust ICT infrastructure, increasingly shaping our post-pandemic teaching contexts.

No matter how motivated the teacher, ICT competence cannot be fully achieved without key resources. According to the cited studies, devices/ software licenses and stable internet connectivity were highlighted as fundamental requirements for effective ICT integration (Ahmad et al., 2023; Kahnbach et al., 2024; Kalinga & Ndibalema, 2023). That limited access to these resources inhibits teachers' ability to adopt and sustain technology-based instructional practices, highlighting the interaction between individual readiness and infrastructural support.

In the literature, ICT competence among teachers is a multidimensional construct influenced by various personal and contextual factors. Motivation with Peer Collaboration: Social influence and peer collaboration encourage motivation and skill development, while Performance expectancy and Effort expectancy determine acceptance. These systems of structural support institutional policies, conditions that facilitate practice, and resource availability ensure that competence can be maintained over time. Yet, despite these insights, gaps persist in how we provide structured, context-sensitive, and appropriate professional development that spans technical, pedagogical, and organizational dimensions.

Guided by findings of previous studies, the present study aims to explore ICT-based instructional competence-supporting strategies by investigating the joint effects of individual beliefs, institutional support, social networks, and resource availability. It specifically aims to identify what can be done to increase teacher competence, foster collaborative professional learning, and maximize the integration of ICT into classrooms.

Autonomy is the degree to which teachers can decide what tools they want to use and how to apply them, which becomes a key intrinsic motivator. Research has shown that environments that support autonomy promote intrinsic motivation and a sustained pursuit of ICT (Whiteford et al., 2021; Chiu, 2022). Top-down mandates, on the other hand, might elicit short-lived compliance without generating long-term commitment. This change in professional judgment about when and how to use technology actively engages teachers in the process, encouraging ownership and creativity.

Competent teachers' sense that they have the technical and pedagogical skills necessary to effectively use ICT is also a key driver of motivation. Teachers who perceive themselves as more confident are more likely to implement and experiment with digital tools (Pozas & Letzel, 2021; Chiu, 2022; Şahin & Şahin, 2022). Research suggests that professional development programs that address both the acquisition of technical skills and increased self-efficacy are especially effective at boosting teachers' motivation. Not only does

competence reduce anxiety of using technology, but it also empowers teachers to use ICT meaningfully in their classroom teaching.

Relatedness, the social connectedness of teachers with their colleagues and professional networks, is an important aspect of teacher motivation. Interactions among peers, mentoring, or collaborative problem-solving strengthen a sense of belonging to a community and reduce cognitive load around ICT adoption, which encourages innovation (Chiu, 2022; Eren & Dikilitaş, 2025). Teachers embedded in these collaborative networks are more likely to be engaged, persistent, and creative in integrating digital technologies into their instruction.

Motivation is also strongly influenced by extrinsic factors, e.g., administrative support and institutional backing. The school leaders' encouragement, access to resources and provision of training opportunities legitimize ICT integration as a priority for the school and enable teachers to continue despite challenges (Arhin et al., 2022; Joshi, 2023). Positive administrative support interacts with intrinsic factors by providing an environment in which teachers' autonomy, competence, and relatedness are adequately exercised.

Algamdi (2025) highlights the importance of fostering learner autonomy (LA) among EFL students in the 21st century, emphasizing that it equips learners with the skills necessary for lifelong learning. The study also shows teachers' ability to navigate and challenge contextual constraints. Additionally, during training, teachers' engagement within the dCPD varied from highly engaged to moderately engaged, with more intense involvement observed in independent activities compared to social or collaborative ones. Interestingly, the engagement patterns and their intensity indirectly influenced teachers' learning outcomes. Post-training, teachers expressed positive satisfaction with their experience, recognizing their autonomous learning during the dCPD and acknowledging some challenges faced. The study offers several recommendations for policymakers in the Saudi Ministry of Education, leaders of higher education institutions, and EFL teachers. It significantly advances both theoretical and empirical understanding of developing TA and LA, contributing to more effective and innovative professional development strategies that can lead to transformational impacts.

Garlington-Hughes (2026) pointed out that retaining middle school teachers has become more difficult due to burnout, limited leadership support, and high job demands. School leaders must recognize these as key factors driving higher attrition. The findings suggest that teacher persistence depends on structural supports as well as on personal meaning, purpose, and relationships. Understanding the experiences of teachers who remain can help administrators improve school climate, enhance leadership, and develop policies that promote teacher well-being. Such efforts can foster environments that support autonomy, trust, and belonging, thereby increasing teacher retention and creating stable, supportive learning communities for students.

Huang et al. (2025) highlighted that, in today's educational landscape, teacher creativity is essential, particularly in language education. Their research emphasizes the importance of psychological factors in boosting individual teacher creativity. Educational leaders can use these findings to develop targeted professional development initiatives that enhance teachers' self-efficacy and collective efficacy. Furthermore, providing teachers with more autonomy in curriculum development and execution creates a setting conducive to the emergence of innovative teaching methods.

Liu et al. (2024) noted that as synchronous online learning becomes more common, concerns about teachers' professional functioning in this new setting have emerged. Although much research has focused on teacher psychology, the control-value theory (CVT) adds valuable perspective on teachers' experiences. Since there is limited research on primary school teachers' psychological experiences in online teaching, this study examined how teachers' online self-efficacy, anxiety, and engagement interrelate within the CVT framework. While anxiety can hinder teachers' full participation in online classes, higher self-efficacy appears to mitigate

anxiety's negative impact, thereby improving teaching effectiveness. These results provide important insights for enhancing teachers' online experiences and achieving better educational outcomes in digital contexts.

Mane (2025) examined teachers' readiness and technology integration in classrooms. The study investigated teaching practices, how often technology is used, teachers' confidence in applying technological, content, and pedagogical knowledge, and technology's influence on learning outcomes. Results showed that ongoing professional development is vital for enhancing teachers' digital skills. Teachers who participated in specific training reported greater confidence and more frequent use of technology in their teaching. Conversely, more experienced teachers may need additional support to adopt new digital tools, especially as professional development programs evolve. The study identified ongoing issues with uneven training quality and limited access to digital resources. Ultimately, it provides valuable insights for educators, school leaders, and policymakers aiming to empower teachers to create dynamic, technology-rich learning environments. By promoting continuous learning and a culture of innovation, schools can better leverage technology to improve student outcomes.

Sharma & Saini (2022) noted that the COVID-19 pandemic has led to revolutionary changes across many areas of life, including higher education, which has experienced a major paradigm shift. Data analysis was conducted in two stages: a) Confirmatory Factor Analysis (CFA) and b) path analysis using Structural Equation Modelling (SEM). Reliability was assessed with Cronbach's Alpha test. The analysis shows that Facilitating Conditions (FC) and Perceived Ease of Use (PEU) significantly influence Confirmed Intention to Use (CIU) of digital technologies, which in turn impacts the Actual Use (AU). Additionally, Self-efficacy (SE) was found to play a significant moderating role between CIU and AU for digital technology adoption.

ICT integration is consistently characterized as a multidimensional construct reflecting the interplay of intrinsic and extrinsic factors affecting teachers' motivation. Autonomy, competence, and relatedness foster intrinsic motivation, whereas administrative support and institutional backing enhance extrinsic motivation. Research shows that sustained ICT use is supported by a combination of professional development and supportive work environments that address both skill-building and psychological needs. These studies do not examine how these processes unfold in high-poverty schools, where resources and leadership support can differ, leaving important gaps in our understanding of how these factors coexist across different school contexts.

The study therefore seeks to explore the role of psychological needs, social support, and institutional backing in teachers' motivation for ICT integration, based on the findings above. This study aims to identify ways to increase intrinsic and extrinsic motivation to support regular, confident, and appropriate use of technology in classroom instruction.

There are many difficulties that teachers face when they start using ICT, and it can be divided into 5 main classifications which include the technical, resource-related, professional, operational and psychological barriers.

Having Technical and infrastructural barriers is consistently recognized as the top hindrance to ICT Integration. (Celeste and Osias, 2024) and (Zikra et al. 2024) have reported that teaching is particularly disrupted in remote or underserved areas due to unstable internet connections, inadequate hardware, limited software availability, and frequent power failures. Even enthusiastic and competent teachers struggle to effectively use ICT when the necessary infrastructure is lacking (Ajani, 2024; Mohd et al., 2024). The studies advise focusing on dependable technology and structural support for of regular classroom integration.

ICT Adoption Limits: Knowledge and Professional Development Gaps. Teachers have limited Technological Pedagogical Content Knowledge (TPACK), making it difficult to integrate digital tools meaningfully into instruction (Saputra & Chaeruman, 2022; Zikra et al., 2024). Maphalala et al. (2022) et Msambwa et al. Whittaker et al. (2023) highlighted that many professional development offerings are

inadequate, excessively theoretical or not connected to what is happening in classrooms. The studies suggest hands-on, situational training that reinforces technical and pedagogical skills.

Organizational and Time Constraints Limit ICT Use. Excessive workloads, inadequate planning time, and lack of administrative support negatively impact teachers' ability to explore digital tools and innovate in instructional delivery (Msambwa et al., 2023; Rizky, 2022). Schools need to plan, especially when it comes to their rules, schedules, and policies so teachers can actually have the time, support, and space they need to use technology in their lessons effectively.

Psychological and Attitudinal Challenges encompass factors such as computer anxiety, resistance to change, and negative perceptions of ICT (Ilic & Ilic, 2021; Li, 2023). These internal barriers interact with factors of competence and motivation, indicating that interventions need to focus on teachers' skills as well as their attitudes towards technology. These challenges need to be addressed through training design that not only builds confidence but also provides mentorship and positive ICT experiences.

All studies reviewed showed that challenges of ICT-based instruction are multidimensional: technical, professional, organizational and psychological. Even competent and motivated teachers are hampered by technical limits and resource shortages, while knowledge gaps and professional development empower access to technology but rarely use it to any transformative end. Organizational constraints and timing pressures leave less room for experimentation, while psychological barriers like fear and resistance limit uptake. Group or the looming group, and adopts a holistic approach.

The goal of the study is to investigate the difficulties teachers face in ICT-based instruction, with consideration of technical, professional, organizational, and psychological issues. By identifying these barriers and their concurrent relationships with teachers' ICT use, the study provides insights for framework designs aimed at improving teachers' competence, motivation, and overall performance when using ICT tools in classrooms.

Pedagogical Alignment is essential for effective ICT professional development. (Ajani, 2024) and (Paidi et al. 2021) highlight the importance of integrating TPACK principles demonstrating "what, why, and how" specific tools support curriculum objectives rather than focusing solely on hardware or software tutorials. This approach ensures that technology use is meaningful and aligned with instructional goals.

Competency-Focused Programs emphasize the development of specific digital skills. (Vanegas et al. 2025) Recommend targeting seven core competencies, including software usage, educational applications, digital platforms, and virtual collaboration, to ensure that teachers can apply ICT effectively across multiple teaching contexts.

Autonomy-Supportive Design fosters intrinsic motivation and engagement. (Chiu, 2022) found that allowing teachers to choose tools relevant to their subject area increases persistence and voluntary experimentation, which strengthens both competence and motivation in ICT integration.

The reviewed literature highlights that effective ICT professional development is multidimensional, combining pedagogical alignment, competency building, autonomy-supportive strategies, hybrid delivery, and lifelong learning. Programs that focus solely on technical skills or one-off workshops are insufficient; sustained, context-sensitive approaches are necessary to develop both teacher competence and motivation. The studies suggest that aligning ICT training with curriculum objectives, providing ongoing support, and fostering teacher choice are key factors in enabling meaningful, long-term technology integration.

Based on these findings, the present study aims to explore strategies for designing professional development programs that strengthen teachers' ICT competence and motivation. Specifically, it investigates approaches that integrate pedagogical alignment, competency development, autonomy, hybrid support structures, and lifelong learning principles to promote effective and sustainable ICT integration in classrooms.

The literature shows that teachers' competence, motivation, and challenges in ICT-based instruction are influenced by personal skills, social networks, institutional support, and resource availability. Effective

technology integration requires professional development that is practical, context-sensitive, and autonomy-supportive. These findings provide a foundation for assessing ICT competence and challenges in East Butuan District 1 and for designing a training design to strengthen skills, motivation, and sustainable classroom integration.

Theoretical/Conceptual Framework

This study was anchored in two complementary theoretical perspectives: the Unified Theory of Acceptance and Use of Technology (UTAUT) developed by Venkatesh et al. (2003) and Deci and Ryan's (1985) Self-Determination Theory (SDT). The integration of these theories provided a comprehensive foundation for understanding teachers' ICT competence, motivation, and challenges in implementing technology-based instruction. UTAUT explains the external and contextual factors that influence teachers' acceptance and utilization of ICT. At the same time, SDT highlights the internal psychological factors that shape teachers' willingness, confidence, and sustained engagement in technology integration. Together, these theories establish a framework for examining how technological conditions and motivational factors interact to shape teachers' capacity to incorporate ICT into classroom practices effectively.

The Unified Theory of Acceptance and Use of Technology (UTAUT) explains how external factors affect individuals' acceptance and use of technology. The model identifies four key determinants: performance expectancy, effort expectancy, social influence, and facilitating conditions. Performance expectancy is the belief that ICT improves teaching effectiveness and student learning. Effort expectancy refers to teachers' perceptions of the ease or difficulty of using digital technologies, which influences their willingness to adopt ICT. Social influence refers to the support teachers receive from administrators, colleagues, and stakeholders. Facilitating conditions involve the availability of organizational support, technical resources, and infrastructure for effective ICT use. This study applies UTAUT to examine how teachers' perceptions of usefulness, usability, social support, and resources affect their competence in integrating ICT into instruction.

While UTAUT addresses external factors in technology adoption, Self-Determination Theory (SDT) focuses on internal motivational processes influencing teachers' ICT integration. According to Deci and Ryan (1985), SDT identifies three core psychological needs: autonomy, competence, and relatedness. Autonomy refers to teachers' independence and control over instructional decisions, including the selection and adaptation of ICT. Competence is their confidence and perceived ability to use digital technologies effectively. Relatedness refers to the sense of connection and supports that teachers gain from colleagues, learners, school leaders, and the broader educational community. When these needs are met, teachers are more likely to be confident, creative, and committed to ICT-based teaching.

Integrating UTAUT and SDT provides a holistic view of ICT adoption by considering both external conditions and internal motivation. UTAUT emphasizes technological accessibility, perceived usefulness, ease of use, and institutional support. SDT explains how teachers' confidence, autonomy, and social connectedness influence their willingness to use ICT. Teachers are more likely to integrate technology effectively when they recognize its benefits, possess the necessary skills, receive adequate support, and feel a sense of ownership and confidence in using digital tools. Conversely, limited resources, insufficient training, and low confidence can reduce motivation and hinder effective ICT implementation.

This study examines teachers' ICT competence, motivation, and challenges in technology-based instruction using both UTAUT and SDT. Teachers' competence depends on their technological knowledge, perceptions of ICT's usefulness and ease of use, and access to resources. Motivation is shaped by confidence, autonomy in decision-making, and support from the professional community. Challenges in ICT implementation can limit teachers' ability to benefit from technology fully. Understanding these factors guides

the development of targeted training that addresses technological needs, enhances motivation, and provides appropriate support.

Integrating UTAUT and Self-Determination Theory provides a comprehensive foundation for this study by considering both technological acceptance and motivational readiness as essential for ICT integration. This framework supports the examination of teachers' ICT competence and the factors influencing their adoption and continued use of digital technologies. With this approach, the proposed training design can address both practical and psychological needs, ensuring teachers have the skills, confidence, and support needed for effective ICT-based instruction.

The conceptual framework on which this study was grounded described the relationships among teachers' competence, motivation, and challenges, as well as the proposed training design for implementing ICT-based instruction. The framework illustrated that teachers' competence and motivation were the primary factors shaping the development of the proposed training design, while the challenges teachers encountered interacted with and influenced these variables.

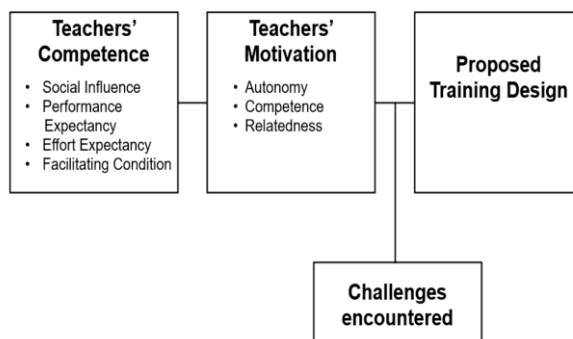
Factors such as social influence, performance expectancy, effort expectancy, and facilitating conditions, which supported teachers' adoption and utilization of ICT resources, played an essential role in shaping teachers' competence. These elements, adapted from the Unified Theory of Acceptance and Use of Technology (UTAUT), influenced teachers' readiness, confidence, and ability to integrate ICT effectively into instructional practices. These conditions strengthened teachers' experiences and capabilities in utilizing technology as part of classroom instruction.

Furthermore, teachers' motivation was anchored in Deci and Ryan's (1985) Self-Determination Theory, which identified autonomy, competence, and relatedness as significant components of intrinsic motivation. Based on this perspective, teachers who experienced empowerment through autonomy, developed confidence in their abilities through competence, and established meaningful connections through relatedness demonstrated stronger motivation to integrate ICT into their teaching practices.

The framework also identified the challenges teachers encountered as a significant factor influencing ICT implementation, alongside competence and motivation. These challenges could either hinder or facilitate the ongoing development of teachers' technological skills and motivation in adopting ICT-based instruction.

The researchers developed the proposed training design based on the interaction among teachers' competence, motivation, and the challenges encountered in implementing ICT-based instruction. The proposed training design aimed to enhance teachers' ICT competence and motivation while addressing barriers to technology integration. Specifically, the researchers designed the training program to strengthen teachers' digital skills, sustain their motivation to use ICT in teaching, and provide appropriate strategies, resources, and support mechanisms to help them overcome challenges in implementing ICT-based instruction.

Figure 1. The Research Paradigm Showing the Interplay of the Variables of the Study



Objectives of the Study

This study aimed to examine the competence and motivation of teachers in implementing ICT-based instruction in East Butuan District 1, including the challenges they encountered in integrating ICT into classroom instruction. Specifically, it sought to: (1) determine the level of teachers' competence in ICT-based instruction in terms of social influence, performance expectancy, effort expectancy, and facilitating conditions; (2) determine the level of teachers' motivation to integrate ICT-based instruction in terms of autonomy, competence, and relatedness; (3) determine the significant relationship between teachers' competence and teaching motivation in ICT-based instruction; (4) identify the challenges encountered by teachers in integrating ICT into classroom instruction; and (5) develop a context-specific training design for ICT teachers based on the findings of the study.

Methodology

The study employed a quantitative descriptive-correlational research design to examine teachers' competence, motivation, and challenges in implementing ICT-based instruction in East Butuan District I, Division of Butuan City. The respondents consisted of 113 teachers selected from a population of 158 across five schools with internet connectivity, with the sample size determined using Slovin's Formula and respondents randomly selected proportionate to school population. Data were gathered using a researcher-developed questionnaire adapted from the Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al. (2003), measuring teachers' competence in terms of social influence, performance expectancy, effort expectancy, and facilitating conditions; motivation in terms of autonomy, competence, and relatedness; and challenges encountered in ICT integration. The instrument was validated by five ICT and education experts and pilot-tested among 30 teachers, yielding a Cronbach's alpha coefficient of 0.957, indicating excellent internal consistency. After securing the necessary permissions and respondents' consent, the questionnaire was administered through printed copies and Google Forms. Weighted mean and standard deviation were used to determine the levels and variability of competence and motivation, frequencies were used to summarize the challenges encountered, and Spearman Rank-Order Correlation (ρ) was employed to determine the significant relationship between teachers' competence and motivation. The findings served as the basis for developing a context-specific ICT training design.

Results and Discussion

Problem 1. What is the level of teachers' competence in ICT-based instruction in terms of social influence, performance expectancy, effort expectancy, and facilitating conditions?

Table 1. Level of teachers' competence in ICT-based instruction

Dimensions	Weighted Mean	SD	Interpretation
Social Influence	4.55	0.48	Very Competent
Performance Expectancy	4.69	0.45	Very Competent
Effort Expectancy	4.19	0.61	Competent
Facilitating Conditions	3.96	0.79	Competent
Grand Mean	4.35		Competent

Table 1 presents the summary of teachers' competence in ICT-based instruction in terms of social influence, performance expectancy, effort expectancy, and facilitating conditions. The four dimensions yielded

a grand mean of 4.35, indicating that the teachers were generally competent in integrating ICT into their instructional practices. Among the dimensions, performance expectancy obtained the highest mean of 4.69 (SD = 0.45), followed by social influence with a mean of 4.55 (SD = 0.48), effort expectancy with a mean of 4.19 (SD = 0.61), and facilitating conditions with the lowest mean of 3.96 (SD = 0.79). These results suggest that teachers' competence in ICT integration is strongest when they recognize the instructional benefits of technology and receive encouragement from their professional environment, while limitations in resources, infrastructure, and technical support continue to constrain the conditions under which ICT can be effectively utilized.

Performance expectancy emerged as the strongest dimension, showing that teachers highly recognized ICT as a useful means of increasing instructional efficiency, productivity, lesson quality, learner engagement, and achievement of instructional objectives. The high rating indicates that teachers are more likely to perceive themselves as competent in ICT integration when digital technologies provide observable benefits to their teaching responsibilities. In particular, the original findings showed that teachers regarded ICT as useful for accomplishing teaching tasks efficiently and improving lesson preparation, suggesting that technology has become an important instructional support rather than merely an additional classroom requirement. This observation is consistent with Poh and Lee (2025) and Wirzberger et al. (2025), who reported that strong performance expectancy contributes to greater digital self-efficacy and classroom technology use. It also supports Kiryakova and Kozuharova (2024), who emphasized that teachers demonstrate stronger technological competence when digital tools provide clear advantages in instructional efficiency and student learning.

Social influence ranked second, indicating that teachers' ICT competence is also shaped by encouragement, expectations, and support from school administrators and colleagues. The high mean reflects an organizational environment in which school leaders actively encourage ICT use and teachers receive professional assistance and feedback from their peers. Administrative support was particularly evident in the original results, where support from school administrators received the highest rating within the dimension, while the sharing of effective ICT practices among teachers received the lowest, although still highly rated. This implies that leadership support is already well established, but structured opportunities for peer sharing, mentoring, and collaborative ICT practice may still be strengthened. The result is supported by Ling et al. (2024), who explained that social influence and subjective norms shape technology-use intentions and perceived competence. Similarly, Rasdiana et al. (2024), Aithal and Aithal (2023), and Hussain et al. (2025) emphasized that supportive school leadership, peer mentorship, and collaborative digital experiences contribute to the development and sustained use of teachers' digital competencies.

Effort expectancy ranked third, with teachers assessed as competent in terms of the perceived ease of learning and using ICT. The result indicates that teachers generally find ICT manageable and are able to integrate common digital tools into their lessons without excessive difficulty. However, lower ratings were observed in becoming skillful quickly with newly introduced educational technologies, suggesting that familiarity with basic applications does not necessarily translate into immediate mastery of more specialized or unfamiliar digital platforms. This finding points to the importance of sustained professional development, guided practice, and hands-on training rather than assuming that teachers who possess basic digital literacy can independently master every emerging technology. Ke and Gong (2025) emphasized that user-friendly systems and reduced technological complexity can lessen computer anxiety and strengthen teachers' self-efficacy, while Jamil et al. (2024) similarly observed that mastery of more complex digital tools requires continuing professional development despite teachers' competence in basic ICT use.

Facilitating conditions obtained the lowest mean among the four dimensions, although teachers remained competent overall. This result shows that teachers' ability to integrate ICT is not determined solely by individual skills but also by the availability of equipment, internet connectivity, technical assistance,

policies, financial support, digital resources, and professional development opportunities. The original results showed that administrative encouragement received the highest rating within facilitating conditions, whereas the adequacy of ICT equipment received the lowest rating, highlighting a gap between organizational encouragement and the physical resources necessary to translate such encouragement into sustained classroom practice. Thus, teachers may possess the willingness and capability to use ICT, but inadequate devices, infrastructure, maintenance, and technical support can limit actual implementation. Runge et al. (2023) underscored the importance of structural enabling conditions in teachers' implementation of digital instruction, while Oyetade et al. (2024) emphasized that leadership, supportive policies, and organizational culture enhance ICT utilization.

Taken together, the findings demonstrate that teachers possess a generally favorable level of ICT competence, particularly in recognizing the instructional value of technology and responding positively to social and administrative support. However, the comparatively lower results for effort expectancy and facilitating conditions reveal that competence is not simply a matter of willingness or perceived usefulness; it also depends on teachers' ability to master emerging technologies and on the institutional conditions that enable their sustained use. Consequently, professional development initiatives should not focus only on basic ICT knowledge but should incorporate hands-on training in newer educational applications, troubleshooting, peer mentoring, and collaborative ICT practices, while schools simultaneously strengthen equipment provision, internet access, technical support, and other enabling resources.

Problem 2. What is the level of teachers' motivation to integrate ICT-based instruction in terms of autonomy, competence, and relatedness?

Table 2. *Level of teachers' motivation to integrate ICT-based instruction*

<i>Dimensions</i>	<i>Weighted Mean</i>	<i>SD</i>	<i>Interpretation</i>
<i>Autonomy</i>	4.40	0.50	<i>Motivated</i>
<i>Competence</i>	4.17	0.56	<i>Motivated</i>
<i>Relatedness</i>	4.34	0.54	<i>Motivated</i>
<i>Grand Mean</i>	4.30		<i>Motivated</i>

Table 2 presents the summary of teachers' motivation to integrate ICT-based instruction in terms of autonomy, competence, and relatedness. The three dimensions yielded a grand mean of 4.30, indicating that teachers were generally motivated to integrate ICT into classroom instruction. Autonomy obtained the highest mean of 4.40 (SD = 0.50), followed by relatedness with a mean of 4.34 (SD = 0.54), while competence obtained the lowest mean of 4.17 (SD = 0.56). The findings indicate that teachers' motivation toward ICT integration is primarily strengthened by having professional freedom in deciding how technology is used, receiving positive social and organizational support, and possessing confidence in their ability to apply digital tools effectively.

Autonomy emerged as the strongest motivational dimension, indicating that teachers value having discretion over when, how, and for what instructional purposes ICT is incorporated into their lessons. The high rating suggests that teachers become more internally motivated when technology integration is perceived as a professional choice connected to instructional needs rather than merely a requirement imposed by the school. The original results showed that teachers particularly valued being able to decide when and how ICT should be incorporated into lessons, although their ability to use ICT creatively without unnecessary restrictions received a comparatively lower rating. This implies that empowering teachers to select appropriate technologies, experiment with digital strategies, and adapt ICT use according to learners' needs may strengthen their willingness to sustain ICT-based instruction. Algamdi (2025) and Garlington-Hughes

(2026) similarly found that autonomy-supportive environments increase teachers' willingness to use digital technologies, whereas rigid mandates may produce compliance without sustained intrinsic motivation. Huang et al. (2025) further emphasized that providing teachers with freedom to experiment with ICT strengthens self-efficacy, internal motivation, and creative instructional practice.

Relatedness ranked second, demonstrating that teachers' motivation is also influenced by their sense of connection with learners, colleagues, and school leaders. Teachers perceived ICT as contributing positively to interaction with students, collaboration with colleagues, and participation in a supportive professional environment. The highest-rated indicator within relatedness concerned ICT's contribution to positive interaction with students, while sharing ICT experiences with colleagues received the lowest mean, although it remained within the motivated category. This finding suggests that technology integration becomes more meaningful when it supports interpersonal relationships rather than functioning only as an instructional delivery mechanism. It further indicates that schools could enhance motivation by providing more organized venues for teachers to exchange digital practices, mentor colleagues, demonstrate successful applications, and jointly solve ICT-related instructional problems. Chiu (2022) and Eren and Dikilitaş (2025) emphasized that a school culture characterized by digital connectivity and shared professional expectations reinforces teachers' motivation, while Arhin et al. (2022) highlighted the importance of peer encouragement, mentorship, and professional learning communities in sustaining ICT use.

Competence obtained the lowest mean among the three motivational dimensions but was still interpreted as motivated. The result shows that teachers generally possess confidence in using ICT to support teaching and learning, applying learned digital skills, managing ICT-assisted classroom activities, and achieving instructional goals through technology. However, technical troubleshooting emerged as a notable weakness, as the ability to troubleshoot common ICT problems received the lowest rating within this dimension and showed relatively greater variability among respondents. This indicates that teachers may be confident in using familiar applications for pedagogical purposes but become less secure when unexpected technical problems arise. Such challenges may interrupt classroom instruction and weaken motivation if teachers repeatedly encounter technical difficulties without immediate assistance.

The findings on competence are consistent with Liu et al. (2024), who explained that greater teacher self-efficacy reduces computer anxiety and encourages proactive technology adoption. Mane (2025) similarly emphasized that although teachers may demonstrate strong pedagogical readiness to use ICT, technical difficulties and software complexity continue to require sustained hands-on assistance and professional support. These findings therefore suggest that improving teachers' motivation requires more than encouraging positive attitudes toward ICT; teachers must also be provided with opportunities to develop practical technical competence, especially in troubleshooting, adapting to unfamiliar applications, and responding to technological disruptions during instruction.

Overall, the findings reveal that teachers possess a favorable motivational disposition toward ICT integration, with autonomy emerging as the strongest source of motivation, followed by relatedness and competence. The pattern suggests that teachers are most motivated when they are trusted to make pedagogical decisions, feel socially supported within the school community, and believe they possess the capabilities necessary to use technology effectively. Nevertheless, the comparatively lower competence dimension, particularly in troubleshooting ICT problems, demonstrates the need for professional development that strengthens practical technical confidence. Accordingly, a context-specific ICT training design should combine autonomy-supportive professional learning, collaborative mentoring and peer sharing, classroom-based ICT applications, and hands-on technical troubleshooting to strengthen both teachers' internal motivation and their sustained use of technology in instruction.

Problem 3. Is there a significant relationship between the level of teachers' competence and their motivation in ICT-based instruction?

Table 3 illustrates the correlation analysis between the level of teachers' competence and the level of teaching motivation in ICT-based instruction.

The correlation analysis between the level of teachers' competence and the level of teaching motivation in ICT-based instruction shows that Social Influence has no statistically significant relationship with Autonomy, Competence, or Relatedness (all p -values are above .05). The null hypothesis is not rejected with respect to this variable. This means that peer pressure or external social opinion does not meaningfully correlate with the teachers' feelings of self-determination, capability, or connectedness. In actual classroom environments, external social pressure or administrative mandates often lead to superficial compliance rather than genuine internal drive. When educators feel compelled to adopt digital tools simply because colleagues or supervisors expect them to, technology integration becomes a compliance-driven task rather than a meaningful pedagogical practice. This also demonstrates that while external social influence may drive initial compliance, it fails to cultivate deep self-efficacy or sustained intrinsic motivation among educators (Bembenutty et al., 2024).

Table 3. Correlation analysis between the level of teachers' competence and the level of teaching motivation in ICT-based instruction

		Autonomy	Competence	Relatedness
Spearman's rho	Social Influence			
	Correlation Coefficient	.012	.078	.183
	ρ -value	.897	.411	.052
	Decision on H_0	Do not reject H_0	Do not reject H_0	Do not reject H_0
	Interpretation/Remarks	Not significant	Not significant	Not significant
	Performance Expectancy			
	Correlation Coefficient	.621**	.467**	.597**
	ρ -value	<.001	<.001	<.001
	Decision on H_0	Reject H_0	Reject H_0	Reject H_0
	Interpretation/Remarks	Significant	Significant	Significant
	Effort Expectancy			
	Correlation Coefficient	.648**	.745**	.621**
	ρ -value	<.001	<.001	<.001
	Decision on H_0	Reject H_0	Reject H_0	Reject H_0
	Interpretation/Remarks	Significant	Significant	Significant
	Facilitating Condition			
	Correlation Coefficient	.604**	.668**	.761**
	ρ -value	<.001	<.001	<.001
	Decision on H_0	Reject H_0	Reject H_0	Reject H_0
	Interpretation/Remarks	Significant	Significant	Significant

Regarding performance expectancy, the findings above show that all three relationships are statistically significant ($p < .001$). It implies that higher belief in Performance Expectancy (believing a system/tool helps achieve goals) is strongly associated with higher feelings of Autonomy, Competence, and Relatedness. Observational evidence in educational settings demonstrates that when teachers see tangible improvements in lesson efficiency and student engagement, their motivation changes from passive tool use to active pedagogical ownership. When digital applications streamline lesson preparation or clarify complex concepts for learners, teachers feel more in control of their instruction (autonomy), more confident in their execution (competence), and better equipped to build interactive connections with their students (relatedness).

This finding directly supports established research emphasizing performance expectancy as a central driver of digital self-efficacy and classroom commitment (Sharma & Saini, 2022). Furthermore, it aligns with Tan et al. (2024), who demonstrated that teachers exhibit higher motivation and digital teaching competence when educational technologies yield clear, observable benefits in student learning outcomes and instructional performance.

Table 4 also shows that Effort Expectancy (ease of use) shows very strong positive relationships across all three psychological needs. Notably, it has the strongest link with Competence ($\rho = .745, p < .001$), indicating that when technology/tasks are easy to use, individuals feel considerably more competent. In actual classroom environments, software platforms with high technical complexity or cumbersome interfaces create friction, leading to technology-induced anxiety and frustration. Conversely, when digital tools feature intuitive designs and minimal operational requirements, educators can incorporate them seamlessly without fear of technical disruption. Removing these operational barriers lets teachers focus on instruction, directly reinforcing their confidence and sense of mastery in digital teaching.

This finding highlights the role of user-friendly platforms in fostering teacher self-efficacy (Whiteford et al., 2021). Furthermore, (Şahin & Şahin, 2022) who posited that minimizing technical complexity and providing practical, intuitive tools directly reduces computer anxiety, thereby cultivating higher professional competence and sustained technology adoption.

Facilitating condition also shows a very strong, positive relationship across all three psychological needs; the strongest positive association is with Relatedness ($\rho = .761; p < .001$). It means that having adequate organizational/technical support and resources significantly correlates with higher psychological satisfaction. It implies that providing strong environmental support and proper tools is essential not just for functionality, but for making users feel capable and connected.

Problem 4. What are the challenges encountered by teachers in integrating ICT into classroom instruction?

Table 4 presents the challenges encountered by teachers in integrating ICT into classroom instruction.

Table 4. *Challenges encountered by the teachers in integrating ICT into classroom instruction*

Challenges identified	f	%
Limited ICT resources	91	80.5
Lack of training and skills	70	63.7
Technical problems	68	60
Time constraint	63	55.7
Poor internet connectivity	51	45
Technical support	42	37
Inadequate administrative support	37	32.7

Table 4 presents the challenges encountered by teachers in integrating ICT into classroom instruction. Limited ICT resources were the most frequently identified challenge, reported by 91 respondents (80.5%). This finding demonstrates that insufficient access to technological equipment and digital resources remains a significant barrier to effective ICT implementation. The high percentage likely reflects disparities in the availability of facilities and resources required to support technology-based instruction.

In contrast, inadequate administrative support was the least frequently reported challenge, with 37 respondents (32.7%). This result suggests that most teachers received adequate encouragement and support from school leadership, although some concerns persist. Overall, the findings indicate that resource

availability and technical capacity are more significant challenges than organizational support for integrating ICT into classroom instruction.

The empirical distribution of challenges reveals that material resource deficits and pedagogical skill gaps constitute the primary bottlenecks to seamless ICT adoption. In actual classroom environments, teachers are frequently eager to modernize their instructional methods, yet they are hampered by insufficient working hardware, outdated software, or an unequal computer-to-student ratio. When physical equipment is scarce or unreliable, educators are forced to revert to conventional teaching modalities simply to maintain classroom management and lesson momentum. Furthermore, the combination of technical troubleshooting demands and heavy administrative workloads creates significant time pressures, leaving little room for teachers to design complex digital lesson plans or undergo self-paced upskilling.

These findings closely related to the prominence of resource scarcity as a key obstacle supports the work of Celeste and Osias (2024) and Zikra et al. (2024), who highlighted that essential physical infrastructure is a crucial prerequisite for sustainable digital initiatives. Additionally, widespread skill gaps and time limitations reflect Ajani's (2024) findings, which show that without ongoing professional development and dedicated preparation time, teachers face increased instructional challenges that ultimately hinder their readiness for digital pedagogy.

Training design for ICT teachers

Table 5 presents the proposed training design for ICT teachers based on the findings of the study. It outlines key areas for enhancement, including pedagogical ICT integration, workshop-based tool mastery, and practical application-oriented skills, to strengthen teachers' effective use of ICT in classroom instruction.

All statements recorded high evaluation scores, indicating strong institutional demand for targeted capacity building. The indicators show that educators strongly express a personal need for further training, value practical workshops and hands-on applications over theoretical lectures, and emphasize the need for continuous technical support embedded in regular professional development programs.

The empirical data in Table 6 confirms that teachers recognize their ongoing need for digital upskilling and actively seek structured, practical opportunities to refine their ICT practices. In practice, traditional one-time technology seminars often fail because they focus heavily on theoretical operations without offering real-world classroom applicability. Teachers benefit most from hands-on, workshop-based formats that let them develop usable lesson assets in real time, supported by ongoing technical assistance as they implement these tools in their classrooms.

Problem 5. Based on the findings of the study, what context-specific training design for ICT teachers may be proposed?

Table 5. Training design for ICT teachers may be proposed.

Findings of the Study as the Basis for Proposed		
Aspects	Enhancement	Proposed Enhancement
1. Pedagogical ICT Integration	Hands-on workshops on embedding software, subject-specific apps, and interactive digital boards into everyday unit plans.	Enhanced teacher capability to seamlessly merge digital tools with core instructional objectives.
2. Workshop-Based Tool Mastery	Interactive bootcamps covering Learning Management Systems (LMS), digital assessment tools, and media generation software.	Direct improvement of classroom instruction and increased instructional efficiency.

3. Practical & Application-Oriented Skills	Project-based learning sessions where teachers create immediately deployable digital materials, lesson modules, and interactive tasks.	Immediate transition from theoretical knowledge to functional, classroom-ready execution.
4. Sustained Technical & Mentorship Support	Establishment of peer-mentorship circles, ICT help desking, and regular bi-weekly technical check-ins.	Continuous, long-term support system to troubleshoot issues and maintain digital confidence.
5. Comprehensive Professional Development	Integration of digital literacy standards into school-wide annual professional development and continuous training calendars.	Institutionalized, self-sustaining digital capability across all teaching departments.

These observations demonstrate that training programs emphasizing practical application, ongoing peer mentorship, and sustained technical support produce far higher rates of successful technology adoption than isolated, passive lectures (Vanegas et al., 2025; Ajani, 2024). Furthermore, providing continuous, structured ICT development directly satisfies teachers' psychological need for competence, thereby reinforcing long-term motivation and pedagogical self-efficacy (Paidí et al. 2021).

Conclusions

Based on the empirical findings, the following conclusions were drawn:

First, teachers demonstrated a high level of competence in implementing ICT-based instruction. This finding suggests that teachers possess the requisite skills and confidence to use ICT to improve instructional delivery, enhance learner engagement, and support technology-integrated learning environments.

Second, teachers were motivated to integrate ICT-based instruction due to factors such as autonomy, competence, and relatedness. This suggests that teachers' willingness to use technology increases when they experience independence, confidence, and meaningful interactions with learners and colleagues.

Third, the study identified limited ICT resources, insufficient training and skills, and technical problems as the primary challenges affecting ICT integration. These factors constrained teachers' ability to effectively utilize digital tools in classroom instruction due to inadequate resources, technical expertise, and support systems.

Furthermore, the findings revealed that performance expectancy, effort expectancy, and facilitating conditions were significantly associated with teachers' motivation. Teachers were more likely to integrate ICT when they perceived technology as useful, manageable, and supported by sufficient resources. In contrast, social influence did not have a significant effect on teachers' motivation.

Lastly, the researcher developed the proposed ICT Teachers' Training Design to address the identified gaps in teachers' competence and motivation, as well as challenges. The training design emphasizes pedagogical integration of ICT, mastery of digital tools, practical application skills, mentorship support, and continuous professional development to enhance teachers' capacity to implement ICT-based instruction.

Recommendations

Based on the study's findings and conclusions, the following recommendations are presented:

School administrators and instructional supervisors may implement targeted professional development programs focused on hands-on ICT application and digital material development. Training activities may prioritize creating digital learning resources, integrating educational applications, and classroom-based technology practices rather than focusing solely on theoretical discussions. These initiatives will strengthen

teachers' practical ICT competencies, improve their confidence in using digital tools, and enhance their ability to design meaningful technology-supported learning experiences.

School leadership may address existing ICT resource limitations by improving digital infrastructure, upgrading available hardware, strengthening internet connectivity, and establishing reliable technical support systems. Since inadequate ICT resources remain a major barrier to effective technology integration, providing accessible, functional technological facilities will enable teachers to maximize the use of ICT tools, reduce instructional disruptions, and sustain consistent implementation of ICT-based instruction.

Schools may provide teachers with accessible, user-friendly learning management systems and digital applications to support efficient instructional planning and delivery. Selecting technology platforms with simplified interfaces and practical classroom applications will reduce technical difficulties, increase teachers' self-efficacy, and allow educators to focus more on pedagogical practices rather than operational challenges.

Academic institutions may establish peer mentorship programs and professional learning communities to promote ongoing collaboration, knowledge sharing, and technical problem-solving among teachers. These structures will enable educators to exchange effective ICT practices, support each other in addressing technology-related challenges, and foster a collaborative culture that advances sustainable ICT integration.

Researchers may broaden investigations of teacher ICT competence and motivation by examining larger populations, varied educational contexts, and the long-term outcomes of technology integration. Employing mixed-methods approaches may provide deeper insights into how teacher motivation, institutional support, and ICT implementation affect learner engagement and academic outcomes over time.

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