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Factors affecting ICT competency of teachers at Districts 1 and 2 secondary schools of Solano, Nueva Vizcaya

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Abstract

Aim: This study investigated the factors affecting the ICT competency of teachers in Districts I and II secondary schools of Solano, Nueva Vizcaya, particularly focusing on teacher training and the availability of ICT resources in schools. The study aimed to determine how these factors influence teachers' ability to integrate technology into teaching and learning processes.

Methodology: The study employed a descriptive-correlational research design. Data were collected from 30 TLE-ICT teachers using a structured questionnaire adapted from the Survey of Schools: ICT and Education (SSIE). Descriptive statistics, particularly the mean, and Pearson r correlation analysis were used to analyze the data at a 0.05 level of significance.

Results: The findings revealed that most teachers had limited years of ICT-related training, while ICT resources and facilities were moderately available in schools. Teachers demonstrated a high level of ICT competency. Statistical analysis further showed a significant relationship between teacher training, availability of ICT resources, and ICT competency.

Conclusion: The results emphasize the importance of sustained ICT professional development, adequate technological infrastructure, and continuous institutional support to enhance teachers' digital competence and improve technology-integrated instruction in secondary education.

Keywords: *availability of ICT resources, ICT competency, teacher training*

INTRODUCTION

The integration of Information and Communication Technology (ICT) has become a defining feature of contemporary education, particularly in the shift toward digitally supported and blended learning environments. Empirical evidence indicates that ICT, when effectively integrated, enhances student engagement, collaboration, and academic achievement (Bond et al., 2018). However, these outcomes are contingent upon teachers' competence in selecting and applying digital tools in pedagogically meaningful ways (Falloon, 2022).

Globally, frameworks such as the UNESCO *ICT Competency Framework for Teachers* emphasize the progressive development of teachers' digital skills, from basic technological literacy to advanced pedagogical integration. Studies consistently show that access to ICT resources alone does not ensure improved learning outcomes; rather, teacher competence remains the most critical factor influencing effective implementation (Tondeur et al., 2012; Redecker, 2022). Teachers with higher ICT competence are more likely to implement learner-centered and interactive instructional strategies.

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In the Philippine context, the Department of Education (DepEd) has reinforced ICT integration through policies and programs such as the Philippine Professional Standards for Teachers (PPST), the DepEd Computerization Program (DCP), and the Digital Rise Program. Despite these initiatives, disparities in ICT access, training, and utilization persist across schools (Garcia et al., 2022; Rogador et al., 2025)

Despite policy support, challenges such as limited resources, insufficient training, and varying levels of ICT competence continue to affect implementation (Scherer et al., 2021; Falloon, 2022). These challenges underscore the importance of examining contextual factors influencing teachers' ICT competence at the local level.

In Districts I and II of Solano, Nueva Vizcaya, variations in ICT resources and professional development opportunities are evident. While some schools demonstrate adequate access to digital tools, others face constraints that may influence instructional practices. Understanding how these factors relate to teachers' ICT competence in this context remains essential.

Review of Related Literature and Studies

A substantial body of empirical research underscores the centrality of teachers' ICT competence in enhancing instructional quality and student learning outcomes. ICT-competent teachers are more likely to design interactive lessons, facilitate collaborative learning, and promote higher-order thinking skills among students (Bond et al., 2018; König et al., 2022). Importantly, ICT competence extends beyond technical proficiency to include pedagogical integration, assessment practices, and the capacity to align digital tools with learning objectives (Falloon, 2022; Redecker, 2022).

Evidence consistently indicates that access to ICT resources alone is insufficient to improve educational outcomes. Rather, the pedagogical use of technology determines its effectiveness in the classroom (Tondeur et al., 2008; Scherer et al., 2021). Studies further reveal that sustained professional development significantly enhances teachers' confidence and capability to integrate ICT meaningfully into instruction (König et al., 2022; Falloon, 2022).

Within the Philippine educational context, ICT integration is supported by national policies and programs, including the K to 12 curricula, the Learning Action Cell (LAC) as a school-based professional development mechanism, and the DepEd Computerization Program. Despite these initiatives, empirical studies report uneven implementation, often attributed to disparities in infrastructure, training opportunities, and institutional support (Garcia et al., 2022; Bernardo, 2023).

Local and international research identifies several determinants of teachers' ICT competence, including access to technological resources, availability of training, administrative support, and teaching experience (Tondeur et al., 2008; Maya et al., 2022). Inadequate support in these areas is associated with lower confidence and limited ICT use, whereas adequate training and resource availability are linked to more effective and sustained integration (Lee et al., 2025).

Moreover, global competency frameworks emphasize that ICT should be embedded within pedagogical processes rather than treated as an auxiliary tool. Teachers are expected to design student-centered learning environments, utilize digital tools for formative and summative assessment, and adapt instruction to diverse learner needs (Redecker, 2022). However, without adequate preparation and continuous professional development, the transformative potential of ICT in education remains underutilized (Scherer et al., 2021; Falloon, 2022).

Synthesis and Research Gap

Based on the reviewed literature, ICT competency is an important factor in improving teaching and learning. Studies consistently show that teacher training, access to ICT resources, and institutional support play a major role in successful ICT integration.

However, there are still gaps in existing research. Many studies focus on large-scale settings and do not provide detailed insights at the local level. In addition, most research looks at influencing factors separately rather than examining how they work together.

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There is also limited research focusing on TLE-ICT teachers, who require more advanced ICT skills. Furthermore, few studies explore district-level conditions, where differences in resources and training opportunities may affect teachers' ICT competency.

This study aims to fill these gaps by examining the combined effects of teacher training and ICT resource availability in a specific local context—Districts I and II of Solano, Nueva Vizcaya.

Theoretical Framework

This study is based on the UNESCO ICT Competency Framework for Teachers, which explains how teachers can effectively use technology in education. The framework highlights the need to combine technology, pedagogy, and content knowledge in teaching.

According to this framework, teachers develop their ICT skills over time—from basic use of technology to more advanced applications that support learning and innovation. It also emphasizes the importance of designing lessons that are student-centered and making use of digital tools for teaching and assessment.

The framework also points out that continuous training and support are necessary for teachers to improve their ICT competency. In this study, it serves as a guide in understanding how teacher training and access to resources influence ICT competency.

Conceptual Framework

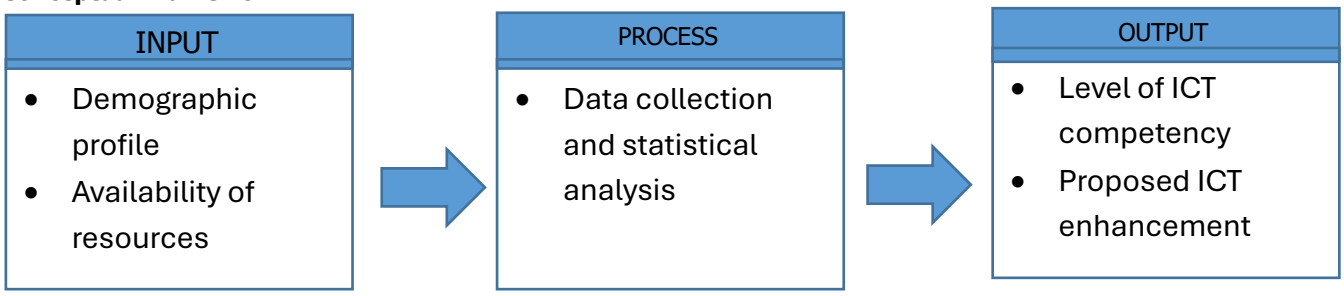

Figure 1: Paradigm of the Study

The diagram above shows the I-P-O Model framework of the study, wherein the input carried the demographic profile of the respondents, the availability of ICT resources in their teaching environment, and the level of their teaching training in using technology these inputs represented the existing conditions that influenced how effectively teachers integrate ICT in the instruction. The process stage involved the methods used to examine these inputs. The study conducted data collection and statistical analysis to gather relevant information about teachers experiences and competencies and to identify relationships among variables. This helped to transform the collected data into meaningful findings. And lastly, the output stage presented the results based on the analysis. These included the level of ICT competency of teachers and the development of proposed ICT enhancement program designed to improve the skills. The output reflected how the inputs, after systematic analysis, led to practical recommendations for strengthening teachers use of ICT in education.

Statement of the Problem

The integration of Information and Communication Technology (ICT) has become an essential part of teaching and learning in today's educational landscape. In the Philippines, the Department of Education (DepEd) continues to promote ICT integration through programs such as the DepEd Computerization Program and the inclusion of ICT in the Technology and Livelihood Education (TLE) and Technical-Vocational-Livelihood (TVL) curriculum. These initiatives aim to enhance teaching practices and equip learners with relevant digital skills.

However, despite these efforts, many schools still face challenges in effectively implementing ICT in the classroom. Teachers play a key role in this process, yet their ability to use technology effectively may vary depending on several factors. Among these are their level of training in ICT and the availability of resources and facilities in their respective schools. Limited access to equipment, insufficient infrastructure, and lack of continuous professional development may affect how teachers integrate ICT into their teaching.

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In Districts I and II of Solano, Nueva Vizcaya, there is a need to better understand how these factors influence teachers' ICT competency. A clearer understanding of this situation can help improve training programs, guide resource allocation, and strengthen ICT integration in schools.

Therefore, this study aims to determine the factors affecting the ICT competency of teachers in Districts I and II secondary schools of Solano, Nueva Vizcaya, with particular focus on teacher training and the availability of ICT resources.

Research Objectives

General Objective

To determine the factors affecting the ICT competency of teachers in Districts I and II secondary schools of Solano, Nueva Vizcaya**.**

Specific Objectives

This study aims to:

1. Determine the training profile of the respondents in terms of years of ICT-related training.
2. Determine the level of availability of ICT resources and facilities in the school for the implementation of the ICT strand.
3. Assess the level of ICT competency among teachers.
4. Examine the relationship between teachers' training profile and their ICT competency.

Research Questions

This study sought to answer the following questions:

1. What is the training profile of the respondents in terms of years of ICT-related training?
2. What is the level of availability of ICT resources and facilities in the school for the implementation of the ICT strand?
3. What is the level of ICT competency among teachers?
4. Is there a significant relationship between teachers' training profile and their ICT competency?

Hypotheses

The study tests the following null hypotheses:

H_{01}: There is no significant relationship between teachers' training profile and their ICT competency.

METHODOLOGY

Research Design

This study employed a descriptive correlational research design. Descriptive design allowed the researcher to assess and present the status of teachers in terms of their training, access to technological resources and the degree of ICT competency. Through this approach the study was able to generate a clear picture of existing conditions in the educational setting. Furthermore, correlational component enabled the examination of the statistical relationships among identified variables. Using quantitative data gathered through structured instruments, the study applied statistical treatment to determine whether significant association existed between teachers training and resource availability. This approach ensured objectivity, measurability and reliability of findings, making it suitable for drawing evidence-based conclusion about the factors influencing teachers ICT competency.

Population and Sampling

Using a purposive sampling, the study focused on 30 TLE-ICT teaching staff from District 1 and 2 of Solano, Nueva Vizcaya, during the academic year 2025-2026. Participants were selected based on their direct involvement in ICT instruction, ensuring the data reflects the most relevant pedagogical experiences in the district.

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Research Instruments

Data were collected using a structured self-reported questionnaire, which consists of a training profile section, a resource availability checklist, and a Likert-scale-based self-assessment tool to measure ICT competency across several domains. The questionnaire is adapted from the Survey of Schools: ICT and Education (SSIE), designed and implemented by European School Net and the University of Liege for the European Commission (European Commission, 2013). In addition, minor revisions were made to the questionnaire to align it with the research objectives and problem addressed. The instrument underwent content validation by a panel of experts in education and ICT, ensuring its relevance and accuracy.

Reliability Testing

A structured questionnaire, adapted from the European Commission's Survey of Schools: ICT and Education (SSIE) was utilized. The instrument was validated by a panel of experts for content relevance. Reliability testing through a pilot study with 30 non-sample teachers yielded a Cronbach's alpha of 0.70, indicating acceptable consistency.

Data Collection Procedure

Data collection involved administering a structured self-reported questionnaire to the target sample, Permission was obtained from the school heads prior to data collection. The researcher provided a printed copy of the questionnaire and distributed them to participants during the School Year 2025-2026 in the different secondary schools of Solano district. All permanent and probationary teachers were considered in the population. All questionnaires were distributed and retrieved at the same time.

Treatment of Data

The variable of Resource Availability" was first analyzed descriptively to establish a baseline of school conditions. Subsequently, it was treated as an independent variable in a Pearson R correlation analysis to determine its relationship with the dependent variable, ICT competency.

Ethical Considerations

Ethical standards were strictly maintained. Written informed consent was secured from all participants. Participation was entirely voluntary and participants were explicitly informed of their rights to withdraw from the study at any time without penalty. Data were anonymized to ensure confidentiality and stored securely.

RESULTS and DISCUSSION

The study included 30 public secondary school teachers from Districts I and II of Solano, Nueva Vizcaya. Also, the responses were treated using means and the Pearson r to determine a significant relationship between the variables with an alpha level of 0.05.

Problem 1. What is the training profile of the respondents in terms of years?

Table 1 shows the profile of the respondents in terms of training years in ICT. Data shows that over half of the respondents have undergone less than three years of professional training, with a frequency of 16, signifying that a significant portion of ICT teachers are still in the early stages of professional growth. Only a small percentage have more extensive training experience, underscoring the need for ongoing capacity-building programs.

While their professional training experience is generally limited, their involvement in TLE and ICT classes signifies a growing integration of ICT in teaching practices. This pattern reflects an emerging stage of ICT competency development among educators, highlighting the need for continuous professional learning and ICT-focused training to further enhance instructional quality and technological proficiency.

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Table 1
ICT Training Profile of the Respondents in Terms of Number of Years

Profile	Frequency	Percentage
Years of Training		
Less than 3 years	16	53.00
3-5 years	8	27.00
6-10 years	5	17.00
11-20 years	1	3.00
Total	30	100.00

Teachers' ICT competencies substantially influence their attitudes towards digital use in teaching, as noted by Caratiquit et al. (2025). Favorable working conditions support ICT use, but they are not sufficient on their own, highlighting the need for comprehensive support through ongoing training and improved infrastructure. By focusing on these areas, educational stakeholders can enhance ICT integration, ultimately leading to better educational outcomes. Engaging in workshops and training programs can help teachers navigate the rapidly changing digital landscape.

Furthermore, while most respondents possess relatively limited ICT training experience, their involvement in TLE and ICT classes demonstrates a growing commitment toward integrating digital tools into classroom practices. Also, exposure and active participation in technology-enhanced teaching environments can foster increasing levels of ICT competence over time.

The pattern observed aligns with UNESCO's (2018) *ICT Competency Framework for Teachers*, which stresses the importance of ongoing capacity-building initiatives to develop teachers' technological skills progressively. Therefore, the findings underscore the necessity for continuous ICT-focused professional development to further enhance pedagogical quality, improve technological proficiency, and equip teachers with the skills necessary to lead technology-rich learning environments.

Problem 2. What is the level of availability of resources and facilities in the school for the implementation of the ICT strand?

Table 2
Level of Availability of Resources and Facilities in the School for the Implementation of the ICT Strand

Variable	Mean	Level
Resource Availability	3.73	Moderate

Table 2 presents the level of availability of resources and facilities for the implementation of ICT strand in Solano I and II Districts. The data reveals a total average mean of 3.73 with a description of moderate level, suggesting that ICT resources are generally available and accessible to teachers. These findings resonate with UNESCO's (2018) *ICT Competency Framework for Teachers*, which underscores sufficient infrastructure as a foundational element for technology integration, and align with Cabansag (2020), who reported that while many Philippine districts possess basic ICT resources, they still face challenges in technological upgrades.

Problem 3. What is the level of ICT competency of teachers?

Table 3 displays the ICT competency of teachers, revealing a total mean of 4.01, qualitatively interpreted as *Agree* or *high level*. This finding suggests that teachers possess strong ICT competencies, which can be attributed to their participation in specialized ICT-related training programs. As teachers continue to engage in professional development aligned with information and communication technologies, their proficiency and confidence in using ICT tools are significantly enhanced. This result supports the idea that continuous training is essential for building digital

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competence, aligning with Koehler et al. (2009)'s TPACK Framework, which emphasizes the importance of integrating technological, pedagogical, and content knowledge to effectively implement ICT in the classroom.

Table 3
Level of ICT Competency for Teachers

Variable	Mean	Level
Teachers' ICT Competency	4.01	High

Moreover, this outcome is consistent with the study of Dasal (2025), who found that Filipino teachers who attend ICT-focused trainings exhibit higher levels of digital literacy and are more capable of utilizing technology to support instructional delivery. Similarly, Albion et al. (2015) highlighted that teacher competence in ICT significantly increases when they receive targeted and sustained training, ultimately leading to improved learning outcomes for students.

Furthermore, the findings resonate with UNESCO's (2018) *ICT Competency Framework for Teachers*, which underscores the critical role of teacher capability in ensuring successful ICT integration in education. According to the framework, well-trained teachers are instrumental in fostering 21st-century skills, promoting digital learning environments, and enhancing student engagement and academic performance.

Thus, the data affirm that teacher competence plays a vital role in the effective implementation of ICT in teaching and learning. Continuous professional development and specialized ICT training are key drivers in strengthening educators' digital abilities, ensuring they remain equipped to meet evolving educational demands.

Problem 4. Is there a significant relationship between the respondents' training profile and resource availability, and their ICT competency?

The findings in Table 4 reveal a significant relationship between the respondents' training profile and their ICT competency, indicated by a computed R value of 0.974 and a p-value less than 0.05. This suggests that teachers who have undergone more extensive ICT-related training tend to possess higher levels of ICT competency. Likewise, the analysis shows a significant relationship between resource availability and ICT competency, confirming that schools with more accessible and sufficient ICT facilities have teachers who demonstrate stronger technology skills in teaching and learning processes. These results emphasize that both teacher training and access to ICT resources play crucial roles in developing and enhancing technological proficiency among educators.

Table 4
Analysis of the Relationship of Teacher Training Profile and Resource Availability and their ICT Competency

Variable	Computed R	P-Value	Remarks
Teachers' Training Profile	0.974	<0.05	Significant
Resource Availability	0.861		

This finding aligns with Grygorenko et al. (2021) which asserts that continuous ICT-related professional development, paired with adequate technological infrastructure, is necessary to build teacher competence in technology integration. Similarly, Rahayu et al. (2024) emphasized that ICT competency increases when teachers receive ongoing training designed to strengthen their technological pedagogical content knowledge (TPACK model).

Furthermore, Caratiquit et al. (2025) found that teachers and students with sufficient information and communication technology (ICT) tools and devices establish a robust ICT infrastructure computer laboratory that provides opportunities for professional development, fostering collaboration among teachers. Consistent with Ghavifekr (2015), the need for teachers to be literate and have good skills and knowledge in using ICT to improve their teaching methods and approach is desired to promote effective learning as well as to meet the demand of 21st-century teaching skills. The current results underscore the importance of capacity-building programs and sufficient ICT resources in promoting successful technology integration in education.

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Conclusions

After careful handling of the data collected to address the research questions, the following conclusions were derived.

First, most ICT teachers have less than three years of ICT-related training, indicating that many educators are still developing foundational digital competencies necessary for effective technology integration in teaching. Continuous professional development remains essential to strengthen teachers' instructional capabilities in ICT-supported learning environments.

Second, ICT resources and facilities in schools were found to be moderately available. While teachers have access to basic technological tools, improvements in infrastructure, equipment availability, and technical support may enhance the implementation of ICT-based instruction.

Third, teachers demonstrated a high level of ICT competency. This suggests that educators are capable of utilizing digital technologies in their instructional practices, likely due to participation in ICT-related professional development activities and increasing exposure to technology-enhanced teaching methods.

Finally, the study confirmed that both teacher training and the availability of ICT resources have significant relationships with teachers' ICT competency. Increased access to professional development opportunities and improved technological infrastructure may contribute to strengthening teachers' digital skills and enhancing the quality of technology-integrated instruction in secondary education.

Overall, the findings highlight the importance of strengthening teacher training programs and improving ICT infrastructure to support effective digital learning environments and promote technology-driven educational innovation.

Recommendations

The following recommendations are offered.

1. Schools and DepEd division offices should conduct systematic and sustained ICT training programs, such as workshops, certifications, and coaching sessions, aligned with current digital education standards, to strengthen teachers' competencies and support long-term professional growth.
2. School administrators should prioritize the acquisition, upgrading, and maintenance of ICT facilities through school improvement plans, partnerships with LGUs and private stakeholders, and the use of ICT-focused funding and grants to ensure adequate and up-to-date resources.
3. Teachers' ICT skills should be continually strengthened through advanced professional development opportunities, such as training in educational software, learning management systems, and digital pedagogy, to further enhance ICT proficiency.
4. DepEd and school leaders should implement an integrated ICT development plan that combines teacher training, infrastructure improvement, and continuous ICT support systems to optimize digital teaching and learning outcomes.
5. Future studies should include a larger sample across multiple school districts and consider additional variables, such as digital teaching strategies, administrative support, student ICT literacy, and challenges in ICT integration. Mixed-methods or longitudinal designs are recommended to provide deeper insights into the long-term impact of ICT training and resource development on teaching performance.

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