The Integration of Information Communication Technology (ICT) in Teaching Among Public Elementary School Teachers at Talipao District, Division of Sulu

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*ABSTRACT***.** This study assessed the extent of ICT integration among public elementary school teachers in Talipao District, Division of Sulu. It employed a descriptive-correlational research design with 100 teacher-respondents Talipao District through a purposive sampling procedure and treated data through frequency, percentage score, weighted mean, standard deviation, Pearson's test of correlation, t-test, and ANOVA. This study examined the extent of ICT integration in terms of instructional practices, teaching competence and readiness, and student engagement and learning outcomes while considering the respondents' demographic profiles such as age, gender, civil status, educational attainment, and length of service. Findings revealed that most of the teacher-respondents were 31 years old and above, majority were female teachers, majority were married, serving for 5 years and below, and with bachelor's degree. Results indicated that the teachers perceived extent of ICT integration across all domains investigated were predominantly perceived as favorable, consistently garnering an 'Agree' rating. Teachers whose 26 to 30 years old have better ways of perceiving the extent of ICT integration in this district. On the significant correlation, very high positive significant correlation has been observed. This validates the TPACK framework which posits that effective ICT integration is a sophisticated overlap of teachers' digital skills with their pedagogical expertise to create meaningful learning experiences. Moreover, this is further reinforced by Diffusion of Innovation Theory that the teachers act as early adopters whose positive perception of technology's relative advantage and compatibility with their teaching goals accelerates the adoption rate transforming the classroom into a performing digital environment where technological confidence is successfully diffused from educators to learners. Finally, this study emphasizes the significance of ICT integration to strengthen pedagogical practices thereby fostering academic success.

KEYWORDS: *ICT Integration, Digital Pedagogy, Teaching Competence, Student Engagement, TPACK Framework, Rural Education*

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Introduction

Information and Communication Technology (ICT) has transformed education by reshaping how people learn, communicate, and prepare for future careers. UNESCO IITE (2019)

emphasized that technology integration in schools is no longer a luxury but a necessity in preparing learners for a rapidly changing world. Studies further highlighted that ICT enhances student engagement, supports personalized learning, and develops critical thinking and collaborative skills essential for long-term success (Izquierdo et al., 2025); Polly & Binns, 2018). In the Philippines, integrating ICT into education has been recognized as essential for improving learning opportunities and aligning with global educational standards (Tomaro, 2018).

Despite these recognized benefits, many schools in the Philippines continue to face challenges in effectively integrating ICT. Studies identified barriers such as inadequate devices, unreliable internet connectivity, limited infrastructure, and insufficient teacher training and support (Mastul et al., 2023). In some Mindanao districts, initiatives providing ICT training and resources have shown positive effects on student engagement, although gaps in access and implementation remain evident (Peralta-Ruales & Adriano, 2011). Successful programs in other areas, such as partnerships that provided schools with smart TVs, laptops, and internet access, demonstrated how adequate resources can improve teaching practices and student learning experiences (Umali, 2019).

In Talipao District, Division of Sulu, similar concerns regarding ICT integration persist. Some classrooms have limited access to computers, others continue to rely mainly on printed materials, and internet connectivity remains inconsistent. Moreover, there is limited data regarding the extent of ICT integration among public elementary school teachers in the district, particularly in terms of available resources, utilization in teaching, and support needed by educators.

Therefore, this study aimed to assess the integration of ICT in teaching among public elementary school teachers in Talipao District, Division of Sulu. Specifically, it sought to examine the current status of ICT utilization, identify challenges affecting implementation, and provide context-specific strategies to strengthen technology-supported teaching and learning. The study is anchored on Sustainable Development Goal 4 (SDG 4), which promotes inclusive and equitable quality education for all (United Nations, 2015).

Research Questions

1. What is the demographic profile of the teacher-respondents of Talipao District, Division of Sulu, in terms of:
    - 1.1. Age;
    - 1.2. Gender;
    - 1.3. Civil Status;
    - 1.4. Educational Attainment; and
    - 1.5. Length of Service?
2. What is the extent of ICT integration among public elementary school teachers in Talipao District, Division of Sulu as to:
    - 2.1. Instructional Practices;
    - 2.2. Teaching Competencies and Readiness; and
    - 2.3. Student Engagement and Learning Outcomes?
3. Is there a significant difference in the extent of ICT integration among public elementary school teachers at Talipao District, Division of Sulu, when data are classified according to their demographic profile in terms of:
    - 3.1. Age;
    - 3.2. Gender;
    - 3.3. Civil Status;

3.4. Educational Attainment; and
3.5. Length of Service?

4. Is there a significant correlation among the subcategories subsumed under the extent of ICT integration?

Literature

ICT Integration and Teacher Competencies

The incorporation of Information and Communication Technology (ICT) in education is a crucial aspect of educational reform, improving instructional efficacy and student involvement in public elementary schools. Effective ICT integration, based on the Technological Pedagogical Content Knowledge (TPACK) framework, necessitates the synchronization of technological abilities with pedagogical and content knowledge (Koh et al., 2016; Tondeur et al., 2016). In the Philippine setting, the integration of ICT is closely related to teachers' ICT competencies and TPACK performance, with superior ICT abilities correlating with more successful technology-enhanced instruction (Polancos, 2026). Likewise, the utilization of ICT encourages innovative, student-centered methodologies that enhance cooperation, critical thinking, and active learning (Verdeflor et al., 2025).

Recent studies highlight teacher preparedness as a critical factor in the use of ICT. Although numerous elementary educators in the Philippines exhibit fundamental digital literacy, obstacles persist in utilizing ICT for effective, student-centered pedagogy (Gonzales & Mendoza, 2021; Valdez et al., 2023). Technical skills, readiness, ethical awareness, and institutional policies for responsible usage affect the integration of ICT (Chavez et al., 2024). Del Mundo et al. (2024) observed that apprehensions regarding academic integrity and ethical use influence technology adoption, underscoring the necessity for explicit policies. Moreover, ongoing In-Service Training (INSET) and professional development enhance ICT competencies and classroom integration (Carogong & Tepacia, 2025), while school-based coaching and collaborative support facilitate sustained ICT utilization in disadvantaged regions. Castro et al. (2024) discovered that educators managing several topics encounter workload limitations that may restrict the preparation and implementation of ICT-based instruction.

Infrastructure and Institutional Support

Despite ICT policy attempts, infrastructural deficiencies persist as a significant obstacle in Philippine public elementary schools. Unreliable internet access, inadequate technological resources, and power outages persist in obstructing ICT integration (Fernandez & Baynosa, 2025; DepEd, 2023). In Talipao District, restricted access to technology substantially impacts teacher readiness and student involvement (Amin, 2025).

Institutional support is crucial for the ongoing integration of ICT. Institutions led by technologically proficient leaders and educators exhibit enhanced ICT adoption and more favorable attitudes towards technology utilization in teaching (Maala & Lagos, 2022). Moreover, community partnerships and localized ICT activities in resource-limited environments augment responsiveness and assistance, especially via community-based and hyper-localized ICT systems that increase service delivery (Macose, 2022).

Implementation Challenges and Research Gap

Despite the evident educational advantages of ICT integration, disparities persist in its practical use within rural and underprivileged settings. Most current research emphasizes competencies, infrastructure, and policy at a broad level, with limited empirical evidence regarding the degree of ICT integration among public elementary school educators in Talipao District,

Division of Sulu. This study investigates teachers' ICT integration methods and identifies factors affecting implementation in local classroom environments.

Methodology

1. Research Design

This study employed a quantitative descriptive-correlational research design to examine the extent of ICT integration among public elementary school teachers in Talipao District, Division of Sulu. This design was used to describe current ICT integration practices and determine the relationships between teachers' demographic profiles and the dimensions of ICT integration, namely Instructional Practices, Teaching Competencies and Readiness, and Student Engagement and Learning Outcomes.

2. Participants and Sampling

The respondents consisted of 100 public elementary school teachers in Talipao District, Division of Sulu, who were actively teaching during the School Year 2025–2026. A purposive sampling technique was used to select participants based on their availability and relevance to the study. Participation was voluntary, and ethical standards such as informed consent, confidentiality, and anonymity were strictly observed throughout the research process.

Table 1. Distribution of Respondents by School

Elementary Schools of Talipao District	Number Of Respondents
1. Ablayan Elementary School	7
2. Bandang Elementary School	7
3. Bilaan Central School	20
4. Buntod Elementary School	9
5. Haji Hassan Idon Elementary School	7
6. Kagay Elementary School	9
7. Kabungkol Elementary School	6
8. Pantao Elementary School	7
9. Talipao Proper Elementary School	10
10. Tuyang Elementary School School	12
Total:	**100**

3. Instruments

Data were gathered using a structured two-part questionnaire adapted from Ghavifekr and Rosdy (2015), "Effectiveness of ICT Integration in Schools." Part I covered the respondents' demographic profile, while Part II measured the extent of ICT integration in terms of Instructional Practices, Teaching Competencies and Readiness, and Student Engagement and Learning Outcomes. Items were rated using a Likert scale. The instrument was subjected to content validation by two experts from the School of Graduate Studies of Sulu State College to ensure clarity and contextual suitability.

4. Data Collection Procedure

A permit to conduct the study was secured from the Office of the Dean of Graduate Studies and school authorities in the Division of Sulu. The researcher personally administered and retrieved the questionnaires from the teacher-respondents. Completed instruments were checked for completeness prior to data encoding and analysis.

5. Data Analysis

Data were analyzed using both descriptive and inferential statistics. Frequency and percentage were used to describe the respondents' demographic profile. Weighted mean and standard deviation were used to determine the extent of ICT integration. Independent samples t-test was applied to test differences based on gender, while one-way ANOVA was used for age,

civil status, educational attainment, and length of service. Pearson Product-Moment Correlation was used to determine relationships among the sub-variables of ICT integration.

Results

1. Demographic Characteristics of the Respondents

Analysis of the demographic profile of the teacher-respondents (N = 100) in Talipao District, Division of Sulu, shows that the majority were aged 31 years old and above (78%), indicating a predominantly mature teaching workforce. Most respondents were female (87%), while 13% were male, reflecting the female-dominated nature of the profession. In terms of civil status, the majority were married (60%), followed by single (13%) and separated/widowed respondents (12%). Regarding educational attainment, most respondents held only a bachelor's degree (72%), while others had bachelor's degrees with masteral units (18%), masteral degrees (8%), and doctoral degrees (2%). In terms of length of service, most respondents had been teaching for 6–10 years (50%), followed by those with 5 years and below (34%) and 11 years and above (16%), indicating that most were in the early-to-mid stage of their teaching careers.

Table 2: Demographic Profile of the Respondents

Demographic Variable	Number of Respondents (n=100)	Percentage (%)
Age		
25 years old and below	0	0%
26 to 30 years old	22	22%
31 years old and above	78	78%
Gender		
Male	13	13%
Female	87	87%
Civil Status		
Single	13	13%
Married	75	75%
Widowed/ Separated	12	12%
Educational Attainment		
Bachelor's Degree	72	72%
With Master's Units	18	18%
Master's Degree	8	8%
With Doctorate Units	0	0%
Doctorate Degree	2	2%
Length of Service		
5 years and below	34	34%
6-10 years	50	50%
11 years and above	16	16%

2. Extent of ICT Integration Among Public Elementary School Teachers

Overall, the respondents demonstrated a positive extent of ICT integration across the three evaluated domains, with all categories obtaining an "Agree" descriptive rating. Teaching Competencies and Readiness obtained the highest composite mean score (M = 3.993, SD = .77736), particularly in teachers' confidence in using basic computer applications relevant to teaching (M = 4.17, SD = .92174), ability to individualize instruction using ICT (M = 4.15, SD = .71598), and openness to further ICT-related professional development (M = 4.01, SD = .88186).

Student Engagement and Learning Outcomes also received an "Agree" rating (M = 3.966, SD = .73102), with teachers reporting that ICT improved student academic performance (M =

4.17, SD = 1.11966), increased student interest and motivation (M = 4.08, SD = .79715), and enhanced student confidence in using technology (M = 4.08, SD = .88398).

Meanwhile, Instructional Practices recorded the lowest composite mean score, though still interpreted as "Agree" (M = 3.590, SD = .82713). The highest-rated practices included designing ICT-integrated lesson plans (M = 4.03, SD = 1.10444), adjusting teaching strategies based on ICT availability (M = 3.80, SD = .99494), and overcoming technical difficulties during ICT-based lessons (M = 3.68, SD = 1.01876).

Table 3: Extent of ICT Integration Among Public Elementary School Teachers in Talipao District, Division of Sulu

Statements	Mean	Standard Deviation (S.D.)	Descriptive Interpretation
Instructional Practices	**3.590**	**.82713**	**Agree**
1. I regularly use ICT tools (e.g., computers, projectors) to deliver lessons.	3.55	.97318	Agree
2. I incorporate multimedia resources (videos, animations) during my teaching sessions.	3.32	1.17963	Neutral
3. I design lesson plans that integrate various ICT applications.	4.03	1.10444	Agree
4. I use online platforms or educational software to supplement classroom instruction	3.18	.90403	Neutral
5. I encourage students to use ICT devices in completing class activities.	3.48	1.06818	Neutral
6. I adjust my teaching strategies based on the availability of ICT resources.	3.80	.99494	Agree
7. I incorporate ICT to create interactive and collaborative learning experiences	3.62	.96169	Agree
8. I use digital assessments or quizzes to evaluate student understanding.	3.58	1.03651	Agree
9. I update my instructional materials to include current ICT trends.	3.66	1.11210	Agree
10. I am able to overcome technical difficulties during lessons using ICT.	3.68	1.01876	Agree
Teaching Competencies and Readiness	**3.993**	**.77736**	**Agree**
1. I am confident in using basic computer applications relevant to teaching.	4.17	.92174	Agree
2. I feel prepared to manage a classroom with ICT resources effectively.	3.96	1.01424	Agree
3. I have received adequate training on integrating ICT in teaching.	3.95	1.07661	Agree
4. I can troubleshoot common technical problems with ICT tools independently.	4.00	.82878	Agree
5. I keep myself updated with new educational technologies and ICT tools.	3.93	.93479	Agree
6. I am capable of using software to create engaging learning materials.	3.96	.80302	Agree
7. I understand how to protect student data and privacy during ICT use.	3.97	.82211	Agree
8. I can effectively use ICT to individualize instruction based on student needs.	4.15	.71598	Agree
9. I can integrate ICT in both online and face-to-face teaching environments.	3.83	.96457	Agree
10. I am open to participating in further professional development related to ICT.	4.01	.88186	Agree
Student Engagement and Learning Outcomes	**3.966**	**.73102**	**Agree**
1. Using ICT in lessons increases student interest and motivation.	4.08	.79715	Agree
2. Students actively participate when ICT tools are integrated into teaching.	3.90	.82266	Agree
3. The use of ICT facilitates better understanding of complex topics by students.	3.65	.86894	Agree
4. Students develop better collaboration skills when using ICT.	3.95	.74366	Agree
5. ICT integration supports differentiated learning styles among students.	3.79	.85629	Agree
6. ICT-based activities help improve students' critical thinking skills.	4.01	1.04924	Agree
7. Using ICT enhances the quality of students' class outputs or projects.	3.97	1.02178	Agree
8. The use of ICT tools has improved overall student academic performance.	4.17	1.11966	Agree
9. Students are more confident in using technology due to ICT integration in class.	4.08	.88398	Agree
10. ICT-based activities help improve students' critical thinking skills.	4.06	.85067	Agree

Legend: (5) 4.50 – 5.00=Strongly Agree; (4) 3.50 – 4.49=Agree; (3) 2.50 – 3.49=Neutral; (2)1.50 – 2.49=Disagree; (1)1.00 – 1.49=Strongly Disagree

3. Differences in ICT Integration Based on Demographic Profile

To determine whether the extent of ICT integration varied across demographic groupings, independent samples t-tests and one-way ANOVA were conducted. The analyses revealed a statistically significant difference when respondents were grouped according to age. Teachers aged 26–30 years obtained higher mean scores across the three ICT integration domains (M = 3.700; M = 4.077; M = 4.059) compared to teachers aged 31 years old and above (M = 3.559; M = 3.969; M = 3.939), indicating higher perceptions of ICT integration among younger teachers.

Conversely, no statistically significant differences were found according to gender and educational attainment, indicating similar perceptions of ICT integration across these variables. Likewise, no significant differences were observed according to civil status and length of service across most domains.

However, significant differences emerged under the Student Engagement and Learning Outcomes domain for civil status and length of service. Post-hoc Tukey HSD analysis revealed that separated/widowed teachers reported significantly higher perceptions than married teachers (mean difference = -.56667, p = .032). Similarly, teachers with 5 years and below of service demonstrated significantly higher perceptions than those with 6–10 years of service (mean difference = -.39318, p = .040).

Table 4: Differences in the Extent of ICT Integration Among Public Elementary School Teachers According to Demographic Profile

Demographic Grouping	Domains	Test Statistic (t / F)	p-value (Sig.)	Description
Age				
	Instructional practices	-.704	.000	Significant
	Teaching competencies and readiness	-.574	.000	Significant
	Student engagement and learning outcomes	-.674	.001	Significant
Gender				
	Instructional practices	.584	.561	Not Significant
	Teaching competencies and readiness	.875	.384	Not Significant
	Student engagement and learning outcomes	1.407	.163	Not Significant
Civil Status				
	Instructional practices	1.052	.353	Not Significant
	Teaching competencies and readiness	1.352	.263	Not Significant
	Student engagement and learning outcomes	3.564	.032	Significant
Educational Attainment				
	Instructional practices	1.073	.364	Not Significant
	Teaching competencies and readiness	.548	.651	Not Significant
	Student engagement and learning outcomes	.884	.452	Not Significant
Length of Service				
	Instructional practices	.649	.525	Not Significant
	Teaching competencies and readiness	2.087	.130	Not Significant
	Student engagement and learning outcomes	3.091	.050	Significant

**Significance at alpha 0.05*

4. Correlational Analysis Among the Subcategories of ICT Integration

Pearson Product-Moment Correlation (Pearson's r) was utilized to examine the interrelationships among the subcategories of ICT integration. As shown in Table 4.1, all

subcategories exhibited statistically significant positive correlations (p = .000). The strongest relationship was observed between Teaching Competencies and Readiness and Student Engagement and Learning Outcomes, indicating a very high positive correlation (r = .883). This was followed by Instructional Practices and Teaching Competencies and Readiness (r = .862), and Instructional Practices and Student Engagement and Learning Outcomes (r = .743), both reflecting very high positive correlations. These findings indicate that stronger teacher competencies and readiness in ICT are closely associated with more effective instructional practices and improved student engagement and learning outcomes.

Table 5. Correlations Among the Subcategories of ICT Integration

Variables	Pearson *r*	Sig.	N	Description
Instructional practices				
Teaching competencies and readiness	.862**	.000	100	Very High Correlation
Student engagement and learning outcomes	.742**	.000	100	Very High Correlation
Teaching competencies and readiness				
Student engagement and learning outcomes	.883**	.000	100	Very High Correlation

** *Correlation Coefficient is significant at alpha .01 level*

Discussion

The assessment of public elementary school teachers in Talipao District, Division of Sulu, reveals a workforce predominantly composed of female, married educators aged 31 and above, with 6–10 years of service and mainly holding bachelor's degrees. This demographic profile indicates a relatively stable and moderately experienced teaching population, with most educators situated in early-to-mid career stages. Overall, the composition suggests a workforce that is professionally grounded yet still largely operating within basic academic qualification levels, which may influence both instructional practices and openness to technological integration.

In terms of ICT integration, findings show a generally high level across instructional practices, teaching competencies and readiness, and student engagement and learning outcomes. Teaching competencies and readiness emerged as the strongest domain, reflecting teachers' efforts toward professional growth and technological adaptation, consistent with Diamante et al. (2025). Student engagement and learning outcomes also rated highly, highlighting ICT's role in improving instruction and learner participation. Although instructional practices ranked lowest, ICT is still evident as an established instructional tool rather than a supplement, indicating a shift toward digitally supported teaching. This aligns with evidence that student engagement improves when learning becomes more interactive and student-centered through active learning strategies supported by technology (Legarde et al., 2025).

Regarding differences in ICT integration, results show variation only in terms of age, where a significant difference was found, with teachers aged 26–30 exhibiting a more positive perception of ICT integration. In contrast, no significant differences were observed when grouped according to gender, civil status, educational attainment, and length of service. However, slight patterns emerged, as separated/widowed teachers showed higher perceptions in student engagement and learning outcomes, while those with five years and below of service also demonstrated stronger perceptions in the same domain. Overall, these findings suggest that demographic factors generally have limited influence on ICT integration perceptions, except for age-related variation.

The correlational analysis further reveals strong interrelationships among the ICT integration domains. The strongest association is observed between teaching competencies and

readiness and student engagement and learning outcomes, indicating that improved teacher capability in ICT is closely linked to better student interaction and participation. Instructional practices also show significant relationships with both teaching competencies and readiness and student engagement and learning outcomes, suggesting that effective lesson implementation is dependent on teachers' skills and preparedness. Collectively, these results emphasize that ICT integration in the district operates as an interconnected system, where improvements in teacher competence and instructional design collectively enhance student engagement and learning outcomes.

Conclusion

The results reveal that public elementary school instructors in the Talipao District, Division of Sulu, are primarily mid-to-late career female educators, predominantly married, aged 31 and older, and possess bachelor's degrees, with a significant number having 6–10 years of teaching experience. This indicates a stable, moderately experienced workforce that requires additional academic development.

Overall, the integration of ICT is notably high in instructional practices, teaching competencies, and student engagement and learning outcomes, signifying that ICT is ingrained in classroom instruction and enhances learner motivation, academic performance, and digital confidence for both educators and students. No substantial differences were observed in ICT integration based on gender, civil status, educational attainment, and length of service; however, a significant difference was noted concerning age, with teachers aged 26–30 exhibiting more favorable opinions. Moreover, significant correlations are present among all areas of ICT integration, especially between teaching abilities and readiness, as well as student engagement and learning outcomes, emphasizing the vital function of teacher proficiency in improving learner experiences.

Grounded in TPACK, Vygotsky's Socio-cultural Theory, and Rogers' Diffusion of Innovations Theory, the study underscores that successful ICT integration results from the interplay of teacher expertise, mediated learning, and the incremental adoption of innovations in pedagogical practice. The findings indicate the necessity of enhancing ICT integration through continuous professional growth, advanced educational possibilities, and superior technological infrastructure. Educators are invited to participate in collaborative innovation and seek further studies to improve their pedagogical and technological skills, while parents and community stakeholders are encouraged to support school-based digital initiatives. Students are encouraged to optimize ICT tools for autonomous learning, and future researchers are advised to expand the study's scope throughout the Province of Sulu for a more thorough comprehension of ICT integration practices.

(Disclaimer: While artificial intelligence (AI) was used for language enhancement, all concepts that were generated are entirely original.)

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