

Implementation of Digital Integration Among Public Elementary School Teachers in Talipao District, Division of Sulu

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ABSTRACT. This study explored how effectively public elementary school teachers in Talipao District, Division of Sulu, have adopted digital integration. The study employed a descriptive-correlational research methodology involving 100 teacher-respondents selected through purposive sampling. Data were analyzed using frequency, percentage, weighted mean, standard deviation, Pearson's correlation, t-test, and ANOVA. The survey examined digital integration by assessing teacher preparedness, the availability of digital technology infrastructure, and school support, while considering respondents' demographics such as age, gender, civil status, educational achievement, and length of service. The majority of respondents were aged 31 or older, predominantly female, married, had served for 6-10 years, and possessed a bachelor's degree. The results indicated that the level of digital integration implementation across all areas was mostly assessed favorably, with ratings varying from "Agree" to "Neutral". Female instructors had a more positive attitude toward the district's digital integration efforts. A somewhat positive significant association was also found, verifying the Technology Acceptance Model and implying that proper digital tools and school support lower barriers to technology use. The data also show that school principals play an important effect on teachers' behavioral intentions to integrate technology. This is reinforced by the TPACK framework, particularly technical knowledge (TK), which emphasizes how accessible infrastructure improves instructors' abilities to integrate technology with pedagogy. Overall, the study emphasizes the role of digital modernization in improving digital pedagogy, access to digital resources, and the overall educational environment.

KEYWORDS: *Digital Integration, Educational Technology, Teacher Readiness, Digital Infrastructure, School Support, Digital Pedagogy*

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Introduction

Digital technology has become an essential component of 21st-century education, transforming instructional delivery, assessment practices, and school governance. Contemporary education systems increasingly align with Education 4.0, where digital tools support teaching, learning, collaboration, and data-driven decision-making. Effective technology integration relies not just on access to digital resources but also on educators' ability to use these tools effectively to enhance learning outcomes (OECD, 2023).

In the Philippines, the Department of Education (DepEd) has established digital transformation through initiatives like the Digital Rise Program, the DigiEd 2028 Framework, and the MATATAG Curriculum, which focus on digital literacy, innovation, and technology-enabled governance in basic education (DepEd, 2022; DepEd, 2023). Nonetheless, the execution of digital integration is inconsistent, especially in rural and conflict-affected areas where educational institutions struggle with poor infrastructure, unreliable internet access, a scarcity of digital devices, and a lack of technical assistance (Que, 2021; OECD, 2023).

These challenges are particularly noticeable in geographically isolated and disadvantaged areas, where educators are required to use ICT for administrative and instructional tasks despite facing resource limitations. Research shows that educators' digital skills, beliefs, and ongoing professional development access play a crucial role in the effectiveness of technology integration in classrooms (Darling-Hammond et al., 2017; OECD, 2023). Therefore, enhancing teacher preparedness and tailored support is crucial for attaining fair digital education.

Within this context, the Division of Sulu, particularly the Talipao District, reflects the realities of rural public elementary schools confronting unstable network coverage, limited access to digital technologies, and minimal on-site technical assistance. Although teachers generally demonstrate positive attitudes toward technology adoption, digital integration often remains at a basic substitution level rather than advancing toward transformative learner-centered practices (Amin, 2025).

Therefore, this study aims to assess the extent of digital integration implemented by public elementary school teachers in the Talipao District, Division of Sulu. It seeks to explore the technical, pedagogical, and contextual factors influencing educators' use of digital technologies, aiming to offer insights that could guide policy enhancements, capacity-building initiatives, and customized interventions to improve teaching quality and tackle educational inequalities.

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 implementation of digital integration among public elementary school teachers in Talipao District, Division of Sulu in the extent of:
 - 2.1. Teacher Readiness;
 - 2.2. Availability of Digital Technology Infrastructure; and
 - 2.3. School Support?
3. Is there a significant difference in the extent of implementation of digital integration 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 implementation of digital integration?

Literature

Leadership and Institutional Support in Digital Integration

The worldwide educational framework increasingly acknowledges digital integration as vital to 21st-century education. Successful technology integration necessitates access to digital resources, strategic leadership, teacher preparedness, and ongoing professional development (Karacabey, 2021; Roberts, 2023; Tosun, 2024). School administrators are crucial in ICT implementation by providing training, monitoring, and support for novel teaching methods, with strong administrative leadership greatly affecting teachers' adoption of technology-enhanced pedagogy (Gilbert, 2023; Mthanti, 2023).

Teacher Readiness and Digital Pedagogical Practices

Global research indicates that digital integration improves interactive, student-centered learning and instructional delivery (Alam & Mohanty, 2023; Hamid and Sueb, 2025). Nonetheless, obstacles such as deficient infrastructure, restricted digital literacy, and inadequate training continue to exist, especially in remote and underfunded schools (Nhung et al., 2025; Harini et al., 2024; Weiss & Reville, 2025). Despite educators often demonstrating basic technological skills, their use of advanced digital technologies for transformative learning remains limited (Aluko & Ooko, 2022). Favorable attitudes, institutional backing, and effective leadership are essential for successful technology adoption (Antunes et al., 2021).

In the Philippine setting, digital integration has gained prominence in technology-mediated instruction. Regional research identifies educator preparedness, professional advancement, and organizational support as critical factors for effective implementation (Acosta & Acosta, 2025). Younger educators may exhibit superior technological proficiency, but a collaborative school culture and favorable attitudes exert a more significant influence than age. Educators have significant proficiency in multimedia utilization; nonetheless, ongoing obstacles impede effective ICT integration (Agonas et al., 2024). Sustained integration necessitates autonomy, competence, and relatedness (Salvaleon et al., 2025), in addition to a transition towards practical, skill-oriented evaluation methodologies (Chavez & Lamorinas, 2023).

Systemic Barriers and the Implementation Gap

Research in geographically distant regions underscores enduring implementation problems despite sufficient teacher competence. In Sulu, Philippines, educators exhibit commendable levels of technical knowledge, preparation, and self-efficacy; yet, the weak connections across these characteristics indicate disjointed development (Asa & Lim, 2026). This signifies the necessity for consistent, continuous efforts to align competencies in remote situations, where psychological and curricular misalignments further impede implementation (Diamante et al., 2025). Educational administrators can enhance digital learning by implementing community- and home-based support systems (Chavez et al., 2023).

Despite the expanding body of literature on educational technology, limited research has investigated digital integration among public primary school educators in geographically isolated regions like Talipao, Division of Sulu. Existing research predominantly focuses on general ICT implementation, resulting in a deficiency in comprehending the specific circumstances of teacher preparedness, administrative backing, resource accessibility, and implementation obstacles in remote educational institutions. Addressing this deficiency is crucial to strengthen technology-enhanced pedagogical methods in similar settings.

Methodology

1. Research Design

This research utilized a quantitative descriptive-correlational design. The descriptive method was employed to systematically outline the level of digital integration implementation among public elementary school teachers in Talipao District, Division of Sulu, focusing on aspects such as teacher readiness, availability of digital technology infrastructure, and school support. The correlational aspect of the study identified significant differences and relationships among variables according to the respondents' demographic profiles and the subcategories of digital integration.

2. Participants and Sampling

The study involved 100 public elementary school teachers from the Talipao District, Division of Sulu, who were actively employed during the School Year 2025–2026, irrespective of their rank, position, or employment status. A purposive sampling technique was utilized to guarantee that respondents were represented based on age, gender, civil status, educational attainment, and length of service. Participation in the study was voluntary, and ethical standards including informed consent, confidentiality, anonymity, and respect for participants were rigorously maintained throughout the research process.

Table 1. Distribution of Respondents by School

Indanan South District School	Number Of Respondents
1. Bilaan Central School	20
2. Kagay Elementary School	9
3. Pantao Elementary School	7
4. Bandang Elementary School	7
5. Ablayan Elementary School	7
6. Samak Eelementary School	6
7. Talipao Proper Elementary School	10
8. Hji. Hassan Idon Elementary School	7
9. Buntod Elementary School	9
10. Kabungkol Elementary School	6
11. Tuyang Elementary School	12
Total:	100

3. Instruments

Data were collected through a structured survey questionnaire modified from the standardized tool created by Saparin Mat Ibrahim and Hazrat Husnin (2025). The instrument was made up of two components: Part I gathered the demographic profile of the respondents, while Part II assessed the level of digital integration implementation regarding teacher readiness, availability of digital technology infrastructure, and school support through a Likert scale. To ensure contextual suitability, the questionnaire was validated for content by a minimum of two experts from the School of Graduate Studies at Sulu State College.

4. Data Collection Procedure

Before collecting data, permission was obtained from the Office of the Dean of Graduate Studies and from the principals or school heads of the public elementary schools involved in the Division of Sulu. The questionnaires were personally administered and retrieved to ensure efficient distribution, proper guidance, and completeness of responses before data encoding and analysis.

5. Data Analysis

The collected data underwent analysis through descriptive and inferential statistical methods. Frequency and percentage were used to outline the demographic profile of the

respondents. Weighted mean and standard deviation were utilized to assess the degree of digital integration implementation, focusing on teacher readiness, the availability of digital technology infrastructure, and school support. Independent samples t-test and one-way Analysis of Variance (ANOVA) were utilized to identify significant differences among respondents based on demographic variables. Finally, the Pearson Product-Moment Correlation Coefficient (Pearson’s r) was utilized to identify the significant relationships among the subcategories of digital 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 most are in the 31 years old and above age bracket (79%), while only 21% fall within the 26–30 years old range. The teaching workforce is largely female, making up 85% of the respondents, while males account for just 15%. In terms of civil status, the majority of teachers are married, accounting for 76%, while single respondents make up 16%, and those who are separated or widowed represent 8%. Regarding educational attainment, most respondents possess a bachelor’s degree (70%), while others have advanced their education, including those with bachelor’s degree and masteral units (19%), masteral degree holders (9%), and doctoral degree holders (2%). Regarding teaching experience, the majority of respondents have been in the profession for 6–10 years (54%), followed by those with 5 years or less (30%) and those with over 11 years (16%).

Table 2: Demographic Profile of the Respondents

Demographic Variable	Number of Respondents (n=100)	Percentage (%)
Age		
25 years old and below	0	0%
26-30 years old	21	21%
31 years old and above	79	79%
Gender		
Male	15	15%
Female	85	85%
Civil Status		
Single	16	16%
Married	76	76%
Widowed/ Separated	8	8%
Educational Attainment		
Bachelor's Degree	70	70%
With Master's Units	19	19%
Master's Degree	9	9%
With Doctorate Units	0	0%
Doctorate Degree	2	2%
Length of Service		
5 years and below	30	30%
6-10 years	54	54%
11 years and above	16	16%

2. Extent of Implementation of Digital Integration

Overall, digital integration among public elementary school teachers in Talipao District, Division of Sulu shows a range from “neutral” to “agree” across the three indicators, reflecting a partial implementation.

Teacher Readiness achieved a composite mean of 3.090 (SD = .47087), which is interpreted as “neutral.” The highest indicator was the influence of digital skills on integration (M = 3.59, SD = 1.00599, “agree”), while openness across experience levels (M = 3.47, SD = .77140) and perceived teaching effectiveness (M = 3.33, SD = 1.29533) were both “neutral,” reflecting moderate readiness. Availability of Digital Technology Infrastructure had a composite mean of 3.373 (SD = .49500), “neutral.” Key indicators were rated “agree,” including the need for projectors (M = 3.78, SD = .67540), lack of digital teaching aids (M = 3.63, SD = .99143), and insufficient overall infrastructure (M = 3.60, SD = .68165), indicating resource gaps.

School Support achieved a composite mean of 3.995 (SD = .51569), indicating a level of agreement. Strong indicators included the necessity for guidance in utilizing digital tools (M = 4.35, SD = .60927), principal influence (M = 4.13, SD = .56237), and training support (M = 4.09, SD = .80522), demonstrating strong institutional support.

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

Statements	Mean	Standard Deviation (S.D.)	Descriptive Interpretation
Teacher Readiness	3.090	.47087	Neutral
1. I am more comfortable practicing teaching using traditional methods rather than integrating Digital Technology	2.94	.85067	Neutral
2. The use of Digital Technology in teaching increases my workload.	3.15	1.29002	Neutral
3. Digital Technology skills influence the integration of technology-based teaching among teachers in schools.	3.59	1.00599	Agree
4. I find it very difficult to integrate Digital Technology into my teaching.	2.72	.84184	Neutral
5. I face difficulties in terms of skills to use Digital Technology tools in my teaching.	2.78	.77303	Neutral
6. The level of awareness regarding the use of Digital Technology to enhance teaching and learning effectiveness is low among teachers in schools.	2.90	.91563	Neutral
7. I am not proficient in preparing digital learning materials such as videos, slide presentations, and interactive content.	2.80	.95346	Neutral
8. Integrating Digital Technology into the curriculum is a major challenge for teachers in schools.	3.22	.97006	Neutral
9. Teachers with longer teaching experience are less prepared to use Digital Technology compared to new teachers, who are more open to innovation.	3.47	.77140	Neutral
10. The use of Digital Technology affects the effectiveness of my teaching.	3.33	1.29533	Neutral
Availability of Digital Technology Infrastructure	3.373	.49500	Neutral
1. Digital Technology equipment such as laptops and projectors are not provided to every teacher in school.	2.85	1.31330	Neutral
2. The internet network in my school is not strong and stable enough to support digital teaching.	3.48	.74508	Neutral
3. My school lacks a comprehensive Digital Technology infrastructure for classroom teaching needs.	3.60	.68165	Agree
4. I feel unprepared to use Digital Technology in my teaching.	2.80	.75210	Neutral
5. I am not provided with adequate Digital Technology equipment, which hinders the effective integration of digital technology.	2.98	.88740	Neutral
6. The lack of Digital Technology teaching aids, such as interactive software and learning applications, is a challenge in integrating technology-based teaching.	3.63	.99143	Agree
7. The unavailability of Digital Technology Infrastructure affects my teaching quality.	3.44	.76963	Neutral
8. The Digital Technology equipment provided in schools does not match the total number of students.	3.58	1.05582	Agree

Statements	Mean	Standard Deviation (S.D.)	Descriptive Interpretation
9. Projectors are essential digital tools that should be available in every classroom for teaching and learning.	3.78	.67540	Agree
10. Technical issues often hinder the use of Digital Technology in classroom teaching.	3.59	.68306	Agree
School Support	3.995	.51569	Agree
1. The school should provide support and guidance to teachers in using Digital Technology for teaching.	4.35	.60927	Agree
2. The school should regularly monitor teachers' use of Digital Technology in teaching.	3.74	.78650	Agree
3. Providing adequate training from school management can enhance teachers' confidence and readiness in using Digital Technology.	4.09	.80522	Agree
4. My school has a clear long-term plan to improve Digital Technology facilities.	3.76	.71237	Agree
5. The school should recognize that integrating digital-based teaching can enhance students' academic achievement.	4.01	.55949	Agree
6. The school should provide adequate digital infrastructure, such as computers and high-speed internet.	4.03	.67353	Agree
7. The school should provide regular training to enhance teachers' skills in using Digital Technology for teaching.	3.98	.84063	Agree
8. The school should ensure that Digital Technology equipment is consistently maintained.	3.92	.87247	Agree
9. The school should provide high- quality digital learning resources such as e-books and educational applications.	3.94	.70811	Agree
10. The Principal or Headmaster plays a crucial role in influencing the level of digital-based teaching integration in teachers' classrooms.	4.13	.56237	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 the Extent of Digital Integration Implementation Based on Demographic Profile

To assess if the level of digital integration implementation differed among demographic groups, independent samples t-tests and one-way Analysis of Variance (ANOVA) were performed. The analyses showed no significant differences in the extent of digital integration implementation when respondents were categorized by age, civil status, educational attainment, and length of service, as evidenced by the t-values, F-ratios, and p-values obtained ($p > 0.05$ for all comparisons).

However, when analyzed by gender, a significant difference was found in the areas of teacher readiness and the availability of digital technology infrastructure. Female teachers exhibited higher mean scores in teacher readiness ($M = 3.100$) and the availability of digital technology infrastructure ($M = 3.416$) than their male counterparts ($M = 3.033$; $M = 3.126$). This indicates that female educators exhibited a notably greater awareness of the application of digital integration. No significant difference was found in the area of school support. Consequently, the null hypothesis was rejected regarding gender, while it was accepted for age, civil status, educational attainment, and length of service.

Table 4: Differences in the Extent of Implementation of Digital Integration According to Demographic Profile

Demographic Grouping	Domains	Test Statistic (t / F)	p-value (Sig.)	Description
Age				

Demographic Grouping	Domains	Test Statistic (t / F)	p-value (Sig.)	Description
	Teacher Readiness	.265	.792	Not Significant
	Availability of Digital Technology Infrastructure	-.759	.450	Not Significant
	School Support	.097	.923	Not Significant
	Gender			
	Teacher Readiness	-1.504	.031	Significant
	Availability of Digital Technology Infrastructure	-2.127	.036	Significant
	School Support	1.405	.163	Not Significant
	Civil Status			
	Teacher Readiness	.025	.975	Not Significant
	Availability of Digital Technology Infrastructure	.990	.375	Not Significant
	School Support	1.073	.346	Not Significant
	Educational Attainment			
	Teacher Readiness	1.400	.248	Not Significant
	Availability of Digital Technology Infrastructure	.216	.885	Not Significant
	School Support	1.699	.172	Not Significant
	Length of Service			
	Teacher Readiness	.202	.818	Not Significant
	Availability of Digital Technology Infrastructure	1.568	.214	Not Significant
	School Support	.065	.937	Significant

*Significance at alpha 0.05

4. Correlational Analysis Among the Subcategories of Digital Integration

Pearson Product-Moment Correlation (Pearson's r) was employed to investigate the relationships among the subcategories involved in the implementation of digital integration. Table 4.1 indicates that all subcategories demonstrated statistically significant positive correlations ($p = .000$). The most significant correlation was observed between the availability of digital technology infrastructure and school support ($r = .389$), followed by the relationship between teacher readiness and the availability of digital technology infrastructure ($r = .362$), and finally, the connection between teacher readiness and school support ($r = .322$).

These findings show that teacher readiness, digital technology infrastructure, and school support are interrelated elements in the process of implementing digital integration. Consequently, the null hypothesis asserting that "There is no significant correlation among the subcategories subsumed under the implementation of digital integration" was rejected.

Table 5. Correlations Among the Subcategories of Digital Integration

Variables	Pearson r	Sig.	N	Description
Teacher Readiness				
Availability of Digital Technology Infrastructure	.362**	.000	100	Moderate Correlation
School Support	.322**	.000	100	Moderate Correlation
Availability of Digital Technology Infrastructure				
School Support	.389**	.000	100	Moderate Correlation

** Correlation Coefficient is significant at alpha .01 level

Discussion

The findings indicate that public elementary school teachers in Talipao District exhibit a generally positive level of digital integration, even though they are mostly female, married, and mid-to-late career educators with basic college qualifications. The prevalence of educators with 6–10 years of experience highlights a reliable and seasoned workforce; however, the scarcity of those with higher educational qualifications emphasizes the necessity for ongoing professional growth in digital skills.

Overall, digital integration received favorable evaluations in terms of teacher readiness, the availability of digital technology infrastructure, and school support, with school support standing out as the most prominent area. This indicates a significant perceived dedication from administration towards technological progress, yet there exists a disparity between institutional support and the actual availability of sufficient resources and training opportunities.

Availability of digital technology infrastructure ranked second, suggesting that while teachers recognize the importance of digital tools, access to hardware and software is only moderately adequate. Thus, digital integration in the district remains in a developmental stage, where technology is still used more as a supplementary instructional tool rather than being fully embedded in pedagogy.

Teacher readiness obtained the lowest rating, although teachers expressed openness to digital integration. This indicates willingness to adopt technology but highlights limited confidence, technical skills, and training to maximize its use. Targeted professional development is therefore essential, as disparities in innovative practices persist even among frequent technology users (Ramos, 2025), while humanized teaching beyond technical compliance may help address readiness gaps (Chavez, 2023).

Demographic differences such as age, civil status, educational attainment, and length of service did not significantly affect perceptions of digital integration. However, there were significant differences based on gender, especially regarding teacher readiness and the availability of infrastructure, with female educators exhibiting more positive perceptions.

Furthermore, correlational analysis revealed strong significant relationships among teacher readiness, infrastructure availability, and school support. The strongest relationship between infrastructure and school support suggests that administrative commitment directly influences resource provision and maintenance, while teacher readiness is likewise closely associated with both infrastructure and leadership support.

Overall, digital integration in Talipao District is an interconnected system where institutional support, technological infrastructure, and teacher readiness mutually reinforce one another. Although implementation is generally positive, sustained investment in infrastructure, training, and professional development remains necessary to strengthen effective digital learning practices.

Conclusion

The findings indicate that public elementary school teachers in the Talipao District, Division of Sulu, represent a reliable and experienced workforce, predominantly female, married, aged 31 and above, with 6–10 years of service and basic academic qualifications. The implementation of digital integration shows significant institutional support and recognition of school leadership in promoting technological progress; however, this positive environment is obstructed by insufficient digital infrastructure and average teacher preparedness, highlighting a gap between administrative support and practical implementation. Furthermore, factors such as

age, civil status, educational attainment, and length of service did not have a significant impact on teachers' perspectives. However, it was observed that female educators displayed more positive attitudes toward digital integration.

The significant correlations among teacher preparedness, the accessibility of digital technology infrastructure, and institutional support highlight the interconnected nature of digital integration and emphasize the importance of the TPACK framework and the Technology Acceptance Model (TAM). The findings indicate that robust infrastructure and leadership support improve teacher preparedness and inclination to use technology in the classroom. The Division of Sulu and school administrators may prioritize digital modernization, infrastructure enhancement, and focused professional development, while teachers may pursue ongoing upskilling in digital pedagogy, and students may gain from enhanced technology-driven learning experiences. Following studies may encompass additional districts within the Division of Sulu to ascertain whether the reported gap is localized or systemic.

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

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