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

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*ABSTRACT***.** This study assessed the extent of implementation of digital integration among public elementary school teachers in Talipao District, Division of Sulu. It employed a descriptive-correlational research design involving 100 teacher-respondents selected through purposive sampling, with data analyzed using frequency, percentage, weighted mean, standard deviation, Pearson's correlation, t-test, and ANOVA. The study examined digital integration in terms of teacher readiness, availability of digital technology infrastructure, and school support, considering respondents' demographic profiles such as age, gender, civil status, educational attainment, and length of service. Findings revealed that most respondents were 31 years old and above, predominantly female, married, serving for 6–10 years, and bachelor's degree holders. Results showed that the extent of implementation of digital integration across all domains was generally perceived favorably, consistently receiving "Agree" to "Neutral" ratings. Female teachers demonstrated better perceptions of digital integration implementation in the district. A moderately positive significant correlation was also observed, validating the Technology Acceptance Model, which suggests that adequate digital tools and school support reduce barriers to technology adoption. The findings further indicate that school heads play a vital role in teachers' behavioral intention to integrate technology. This is reinforced by the TPACK framework, particularly technological knowledge (TK), emphasizing that teachers' ability to integrate technology with pedagogy is strengthened through accessible infrastructure. Overall, the study highlights the importance of digital modernization in enhancing digital pedagogy, access to digital tools, and the overall educational environment.

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

ARTICLE DETAILS
JEAS-00127; Received: February 27, 2026; Accepted: March 18, 2026; Published: April 8, 2026
CITATION:
Wahiddan, Rasher B., Asiri, Masnona S. (2026). Implementation of Digital Integration Among Public Elementary School Teachers in Talipao District, Division of Sulu. Journal of Education and Academic Settings, 3(1). DOI: 10.62596/kvzm1k44

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

depends not only on access to digital resources but also on teachers' pedagogical competence in utilizing these tools meaningfully to improve learning outcomes (OECD, 2023).

In the Philippines, the Department of Education (DepEd) institutionalized digital transformation through initiatives such as the Digital Rise Program, the DigiEd 2028 Framework, and the MATATAG Curriculum, all of which emphasize digital literacy, innovation, and technology-enabled governance in basic education (DepEd, 2022; DepEd, 2023). However, the implementation of digital integration remains uneven, particularly in rural and conflict-affected communities where schools continue to face inadequate infrastructure, unstable internet connectivity, limited digital devices, and insufficient technical support (Que, 2021); OECD, 2023).

These challenges are especially evident in geographically isolated and disadvantaged areas (GIDAs), where teachers are expected to utilize ICT for both administrative and instructional purposes despite limited resources. Research indicated that teachers' digital competence, beliefs, and access to sustained professional development significantly influence the quality of technology integration in classrooms (Darling-Hammond et al., 2017; OECD, 2023). Thus, strengthening teacher readiness and contextualized support remains essential for achieving equitable 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 implementation of digital integration among public elementary school teachers in Talipao District, Division of Sulu. Specifically, it seeks to examine the technical, pedagogical, and contextual factors influencing teachers' use of digital technologies to provide evidence that may guide policy enhancement, capacity-building initiatives, and localized interventions for improving instructional quality and reducing educational inequities.

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 study employed a quantitative descriptive-correlational research design. The descriptive method was utilized to systematically describe the extent of implementation of digital integration among public elementary school teachers in Talipao District, Division of Sulu, particularly in terms of teacher readiness, availability of digital technology infrastructure, and school support. The correlational aspect of the study determined the significant differences and relationships among variables based on the respondents' demographic profiles and the subcategories of digital integration.

2. Participants and Sampling

The respondents of the study consisted of 100 public elementary school teachers in Talipao District, Division of Sulu, who were actively employed during the School Year 2025–2026 regardless of rank, position, or employment status. A purposive sampling technique was employed to ensure the representation of respondents according to age, gender, civil status, educational attainment, and length of service. Participation in the study was voluntary, and ethical standards such as informed consent, confidentiality, anonymity, and respect for participants were strictly observed 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 gathered using a structured survey questionnaire adapted from the standardized instrument developed by Saparin Mat Ibrahim and Hazrat Husnin (2025). The instrument consisted of two parts: Part I obtained the demographic profile of the respondents, while Part II measured the extent of implementation of digital integration in terms of teacher readiness, availability of digital technology infrastructure, and school support using a Likert scale. To ensure contextual suitability, the questionnaire underwent content validation by at least two experts from the School of Graduate Studies of Sulu State College.

4. Data Collection Procedure

Prior to data collection, the researcher secured permission from the Office of the Dean of the Graduate Studies and from the principals or school heads of the participating public elementary schools in the Division of Sulu. The researcher personally administered and retrieved the

questionnaires to ensure efficient distribution, proper guidance, and completeness of responses before data encoding and analysis.

5. Data Analysis

The gathered data were analyzed using both descriptive and inferential statistical tools. Frequency and percentage were utilized to describe the demographic profile of the respondents. Weighted mean and standard deviation were used to determine the extent of implementation of digital integration in terms of teacher readiness, availability of digital technology infrastructure, and school support. Independent samples t-test and one-way Analysis of Variance (ANOVA) were employed to determine significant differences when respondents were grouped according to demographic variables. Finally, Pearson Product-Moment Correlation Coefficient (Pearson's r) was used to determine 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, reveals that the majority belong to the 31 years old and above age bracket (79%), while only 21% are within 26–30 years old. In terms of gender, the teaching workforce is predominantly female (85%), with males comprising only 15% of the respondents. Regarding civil status, most of the teachers are married (76%), followed by single respondents (16%) and separated/widowed respondents (8%). With respect to educational attainment, the majority of the respondents hold only a bachelor's degree (70%), while others have pursued graduate education, including bachelor's degree holders with masteral units (19%), masteral degree holders (9%), and doctoral degree holders (2%). In terms of length of service, most of the respondents have been teaching for 6–10 years (54%), followed by those with 5 years and below (30%) and those with 11 years and above (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 ranges from "neutral" to "agree" across the three indicators, indicating partial implementation.

Teacher Readiness obtained a composite mean of 3.090 (SD = .47087), 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 recorded the highest composite mean of 3.995 (SD = .51569), interpreted as "agree." Strong indicators included the need for guidance in using digital tools (M = 4.35, SD = .60927), principal influence (M = 4.13, SD = .56237), and training support (M = 4.09, SD = .80522), reflecting strong institutional backing.

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

Statements	Mean	Standard Deviation (S.D.)	Descriptive Interpretation
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
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 determine whether the extent of implementation of digital integration varied across demographic groupings, independent samples t-tests and one-way Analysis of Variance (ANOVA) were conducted. The analyses revealed no statistically significant differences in the extent of implementation of digital integration when respondents were grouped according to age, civil status, educational attainment, and length of service, as indicated by the obtained t-values, F-ratios, and p-values ($p > 0.05$ for all respective comparisons).

However, when categorized according to gender, a statistically significant difference emerged in the domains of teacher readiness and availability of digital technology infrastructure. Female teachers reported higher mean scores in teacher readiness ($M = 3.100$) and availability of digital technology infrastructure ($M = 3.416$) compared to male teachers ($M = 3.033$; $M = 3.126$). This suggests that female teachers demonstrated a relatively higher perception of the implementation of digital integration. No significant difference was observed in the domain of school support. Therefore, the null hypothesis was rejected for gender, but 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				
	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 utilized to examine the interrelationships among the subcategories subsumed under the implementation of digital integration. As shown in Table 4.1, all subcategories exhibited statistically significant positive correlations (p = .000). The strongest relationship was found between availability of digital technology infrastructure and school support (r = .389), followed by teacher readiness and availability of digital technology infrastructure (r = .362), and teacher readiness and school support (r = .322).

These findings indicate that teacher readiness, digital technology infrastructure, and school support are interconnected components in the implementation of digital integration. Therefore, the null hypothesis stating 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 reveal that public elementary school teachers in Talipao District generally demonstrate a positive level of digital integration despite being predominantly female, married, mid-to-late career educators with basic college qualifications. The dominance of teachers with 6–10 years of service indicates a stable and experienced workforce; however, the limited number with advanced educational attainment underscores the need for continued professional development in digital competencies.

Overall, digital integration was positively rated across teacher readiness, availability of digital technology infrastructure, and school support, with school support emerging as the strongest domain. This reflects strong perceived administrative commitment to technological advancement, although a gap remains between institutional support and the actual provision of adequate 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).

In terms of demographic differences, age, civil status, educational attainment, and length of service showed no significant influence on perceptions of digital integration. However, gender showed significant differences, particularly in teacher readiness and infrastructure availability, with female teachers demonstrating more favorable 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 results demonstrate that public elementary school teachers in the Talipao District, Division of Sulu, constitute a stable and seasoned workforce, primarily female, married, aged 31 and older, possessing 6–10 years of service and basic academic qualifications. The execution of digital integration demonstrates strong institutional backing and acknowledgment of school leadership in fostering technological advancement; nonetheless, this favorable context is hindered

by inadequate digital infrastructure and moderate teacher preparedness, revealing a disparity between administrative support and practical implementation. Moreover, age, civil status, educational attainment, and length of service did not significantly affect teachers' perspectives, although female educators exhibited more favorable attitudes toward digital integration.

The substantial correlations between teacher preparedness, the accessibility of digital technology infrastructure, and institutional support validate the interdependent characteristics of digital integration and underscore the relevance 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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