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Influence of Teachers' Digital Literacy Skills on Students' Academic Achievement

JOSEPH A. QUILLOPA
Pamplona Institute, Pamplona, Cagayan, Philippines
joshnov11272980@gmail.com

Abstract — This study investigated the influence of teachers' digital literacy skills on students' academic achievement in selected private schools in Cagayan Province. Using a descriptive-correlational research design, the study assessed teachers' digital literacy across five dimensions, namely, information and data literacy, communication and collaboration, digital content creation, safety and security, and troubleshooting, and students' academic achievement based on their general weighted average. A total of 130 teachers participated through stratified random sampling. Results show that teachers possess very high levels of digital literacy, with an overall mean of 3.77 across all dimensions. Students likewise demonstrated strong academic performance, falling within the "Very Satisfactory" level with a mean grade of 87.80 and minimal variation in achievement. Pearson's correlation analysis revealed that all five dimensions of digital literacy exhibited significant positive relationships with academic achievement, with coefficients ranging from 0.541 to 0.653. Digital content creation showed the strongest association, followed by communication and collaboration, troubleshooting, information and data literacy, and safety and security. These findings confirm that teachers' digital competencies substantially contribute to student performance, particularly through their ability to design engaging digital content, facilitate technology-supported communication, and ensure smooth and safe digital learning processes. The study concludes that enhancing teachers' digital literacy is a critical pathway to improving learner outcomes and recommends sustained, targeted professional development focused on advanced content-creation skills, collaborative digital platforms, and classroom-embedded technology integration.

Keywords — digital literacy, academic achievement, instructional technology

I. Introduction

In the contemporary era marked by rapid advancements in information and communication technologies (ICT), education systems worldwide are undergoing significant transformation. Technology has reshaped how information is accessed, constructed, shared, and assessed in educational contexts. Central to this shift is digital literacy, defined as the ability to use digital tools effectively, critically, and ethically. This competency is essential not only for learners but also for teachers, who play a vital role in facilitating learning within technology-enhanced environments.

The integration of digital technologies in education was further accelerated by the COVID-19 pandemic, which made online platforms and digital resources indispensable. As a result, teachers are now expected to possess digital literacy skills that go beyond basic technical operation

and include pedagogical application, instructional design, and digital facilitation. Educators with strong digital literacy are better equipped to design engaging learning experiences that support student understanding and may enhance academic achievement. However, the extent to which teachers' digital literacy directly influences student performance remains insufficiently explored.

Existing research highlights the importance of digital literacy in academic success, particularly among students. Li et al. (2025) reported a significant positive correlation between students' digital literacy and academic achievement across various grade levels. The findings suggest that students with stronger digital competencies tend to perform better academically, especially in technology-integrated learning environments. Nevertheless, this study focused on learners' digital literacy and did not examine teachers' competencies as a contributing factor.

Similarly, Harimurti et al. (2024) found that digital literacy significantly influenced student engagement and academic achievement in senior high school settings. Their study demonstrated that higher levels of digital literacy were associated with improved participation and academic outcomes. Despite these findings, the research remained student-centered and did not analyze how teachers' digital literacy skills may shape these results.

While several studies have examined digital literacy among students and teachers, few have directly linked teachers' digital literacy skills to students' academic achievement. Many investigations assess teachers' ability to use digital tools or describe disparities between teachers' and students' competencies, yet they often stop short of connecting these skills to measurable academic outcomes.

Some research, such as that by Alieto et al. (2025), has found a link between teachers' digital orientation and student performance, suggesting that positive attitudes toward technology may support learning. However, digital orientation differs from digital literacy, as favorable attitudes do not necessarily translate into effective pedagogical use of digital tools. This distinction highlights the importance of examining skills-based digital literacy rather than perceptions alone.

The research gap is particularly evident in the Philippine context, where digital transformation in education remains uneven. Teachers often face challenges such as limited ICT infrastructure, inadequate professional development, and insufficient institutional support. Despite national policies promoting technology integration, there is limited empirical evidence linking teachers' digital literacy levels to students' academic achievement, especially in basic education settings and private schools.

Addressing this gap is both academically and practically significant. Understanding how teachers' digital literacy influences student achievement can inform teacher training, curriculum development, and policy decisions. Thus, the present study aims to investigate the influence of teachers' digital literacy skills on students' academic achievement, contributing to a deeper understanding of teacher effectiveness and the strategic use of digital technologies to improve learning outcomes.

Literature Review

Digital literacy has become a fundamental component of modern education as schools increasingly integrate information and communication technologies into teaching and learning processes. The rapid digitalization of educational environments has reshaped instructional practices, assessment methods, and teacher–student interactions, placing greater demands on teachers to develop competencies beyond traditional pedagogical skills. Digital literacy, in this context, refers to teachers' ability to effectively access, evaluate, create, and utilize digital tools and resources to support instruction and learning. As classrooms evolve into technology-enhanced spaces, teachers' digital literacy is increasingly viewed as a key determinant of instructional quality and learning effectiveness (Sharma, 2023).

Several studies have emphasized that teachers' digital literacy is closely linked to their professional competence and instructional effectiveness. Teachers with strong digital skills are better able to design interactive learning activities, manage digital learning environments, and facilitate student engagement through technology-supported instruction. Soekamto et al. (2022) found that teachers with higher levels of digital literacy demonstrated stronger professional competence, particularly in lesson planning, classroom management, and the integration of digital resources. Their findings suggest that digital literacy enhances teachers' confidence and flexibility in responding to diverse learning needs, thereby contributing to improved learning experiences for students.

The importance of teachers' digital literacy has been further highlighted in studies examining its relationship with pedagogical knowledge and motivation. Pehlevan and Ünal (2024) reported that digital literacy positively correlates with teachers' motivation and technological pedagogical content knowledge (TPACK). Teachers with higher digital literacy levels were more likely to integrate technology meaningfully into their lessons by aligning content, pedagogy, and digital tools. This integration supports the creation of learner-centered environments that promote deeper understanding and active participation, reinforcing the role of digital literacy as a catalyst for effective teaching practices.

The relevance of teachers' digital literacy became even more evident during the widespread adoption of online and blended learning modalities. Marmoah et al. (2024) revealed that teachers' digital literacy significantly influenced the quality of online learning implementation in secondary schools. Teachers with adequate digital skills were able to manage virtual classrooms efficiently, use interactive platforms, and provide timely feedback, resulting in more structured and engaging learning experiences. Although the study did not directly measure student academic achievement, it implied that effective instructional delivery enabled by teachers' digital literacy may positively influence student learning outcomes.

While a substantial body of research has examined digital literacy in education, much of the literature has focused on students' digital competencies rather than teachers' skills. Li et al.

(2025), in a comprehensive meta-analysis, found a moderate positive relationship between digital literacy and academic achievement, indicating that digital skills play an important role in supporting learning outcomes. However, the focus of this study was primarily on students' digital literacy, leaving unanswered questions regarding how teachers' digital competencies contribute to student academic success. This limitation highlights the need to shift attention toward the instructional role of teachers' digital literacy in shaping academic outcomes.

Related studies have also demonstrated that digital literacy influences academic achievement indirectly through mediating factors such as student engagement and motivation. Widowati et al. (2023) reported that higher levels of digital literacy were associated with greater student engagement, which, in turn, led to improved academic performance. These findings suggest that digital literacy contributes to learning outcomes not only through technical proficiency but also through its impact on instructional strategies and classroom dynamics. Teachers play a crucial role in fostering these conditions by effectively integrating digital tools into teaching practices.

However, findings across studies have not been entirely consistent. Azzahra (2025) found no significant direct effect of digital literacy on academic achievement among prospective chemistry teachers, indicating that digital literacy alone may not guarantee improved learning outcomes. This suggests that digital literacy must be supported by effective pedagogical application and instructional design to positively influence academic performance. Such findings underscore the complexity of the relationship between digital literacy and academic achievement and highlight the need to examine teacher-level competencies rather than focusing solely on learners' digital skills.

Emerging empirical research has begun to address this gap by examining the relationship between teachers' digital competence and student academic performance. Reyes (2025) found a moderate and significant relationship between teachers' digital competence and students' academic achievement in tertiary education. Their findings suggest that when teachers possess the skills to integrate digital tools effectively into instruction, students are more likely to demonstrate higher academic performance. This provides direct evidence that teachers' digital literacy can influence learning outcomes through enhanced instructional practices.

Supporting these findings, Dagohoy and Hinacay (2025) reported that teachers' digital orientation and readiness were significantly associated with pupils' learning performance in public elementary schools. Although their study focused more on teachers' attitudes toward technology than on specific digital literacy skills, it reinforces the idea that teacher-level digital competencies shape students' academic outcomes. Teachers who are digitally prepared are more likely to adopt innovative teaching approaches that support student learning.

Despite the growing recognition of digital literacy as a critical educational competency, the literature reveals a notable gap in studies that directly examine the influence of teachers' digital

literacy skills on students' academic achievement, particularly in basic education contexts. Many existing studies focus on professional competence, instructional practices, or student digital literacy without explicitly linking teachers' digital skills to measurable academic outcomes (Villar-Onrubia et al., 2022; Kasperski et al., 2022; Nguyen & Habók, 2024). Furthermore, mixed findings regarding the impact of digital literacy on achievement suggest that contextual and instructional factors may moderate this relationship (Azzahra, 2025).

In the Philippine educational context, where disparities in access to technology and professional development opportunities persist, there is limited empirical evidence on how teachers' digital literacy affects students' academic achievement. This gap underscores the need for localized research examining how teachers' digital competencies influence student performance in technology-enhanced learning environments. Addressing this gap is essential to informing teacher training programs, policy initiatives, and instructional strategies that maximize the educational benefits of digital technologies.

Research Questions

This study sought to determine the influence of teachers' digital literacy skills on students' academic achievement.

1. What is the level of digital literacy skills of the teacher-respondents in terms of the following?
    a. information and data literacy,
    b. communication and collaboration,
    c. digital content creation,
    d. safety and security, and
    e. troubleshooting
2. What is the level of students' academic achievement as reflected in their general weighted average (GWA)?
3. Is there a significant relationship between teachers' digital literacy skills and students' academic achievement?

II. Methodology

Research Design

This study employed a descriptive-correlational research design to determine the influence of teachers' digital literacy skills on students' academic achievement. The descriptive component provided a comprehensive assessment of the levels of digital literacy skills among teacher-respondents and the academic performance of their students, using quantitative measures to summarize and describe these variables. The correlational component examined the strength and direction of the relationship between teachers' digital literacy skills and students' academic achievement, allowing the researcher to identify whether higher levels of teacher digital competence were associated with improved student performance. This design was appropriate because it enabled the study to describe existing conditions while simultaneously testing the hypothesized relationship between the independent variable (teachers' digital literacy skills) and the dependent variable (students' academic achievement) without manipulating any factors.

Participants of the Study

The respondents of the study were 130 teachers drawn from private schools in the municipalities of Allacapan, Ballesteros, Abulug, Pamplona, Sanchez Mira, and Claveria in the Province of Cagayan, Philippines. A stratified random sampling technique was employed, with each participating school treated as a stratum to ensure balanced representation across locations. From each school's faculty list, 10 teachers were randomly selected who were available during the data-gathering period.

The table below illustrates how the respondents were distributed across the participating schools.

Municipality	**Name of School**	**Sampling**
Allacapan	School A	10
Ballesteros	School B	10
	School C	10
Abulug	School D	10
	School E	10
	School F	10
Pamplona	School G	10
Sanchez	School H	10
	School I	10
	School J	10
	School K	10
	School L	10
Claveria	School M	10
Total	130	

Instrumentation

The study used a researcher-made questionnaire to collect data on teachers' digital literacy skills and students' academic achievement. The first part of the questionnaire assessed the teachers' digital literacy across five dimensions: (a) information and data literacy, (b) communication and collaboration, (c) digital content creation, (d) safety and security, and (e) troubleshooting, using a Likert-scale format to quantify their skills. The second part focused on students' academic achievement, determined from their class general weighted average (GWA) obtained from official school records. This instrument enabled the study to describe levels of digital literacy and academic performance, and to examine the relationship between teachers' digital competencies and students' achievement. The questionnaire was also validated by experts in educational technology and research methodology to ensure its clarity, relevance, and reliability before administration.

Analysis of Data

The collected data were analyzed using both descriptive and inferential statistics. Descriptive statistics, specifically the mean, were computed to determine the levels of teachers' digital literacy and students' academic achievement, as reflected in their general weighted average (GWA). To examine the relationship between the two variables, Pearson's correlation coefficient was employed to assess the strength and direction of the association between teachers' digital literacy skills and students' academic achievement. This approach allowed the study to describe the current state of the variables and determine whether higher levels of teacher digital competence were associated with better student achievement.

III. Results and Discussion

Level of digital literacy skills of the teacher-respondents

The results reveal that the teacher-respondents possess very high levels of digital literacy, as reflected in an overall mean of 3.77, which falls within the "Very High" descriptive range. Across all five dimensions—information and data literacy, communication and collaboration, digital content creation, safety and security, and troubleshooting- the mean scores consistently ranged from 3.76 to 3.77, indicating uniformly strong competencies. Among the subdomains, safety and security posted the highest mean (3.77), demonstrating teachers' strong awareness of ethical digital practices and online safety protocols. Likewise, high means in communication and collaboration (3.77) and information and data literacy (3.77) suggest that teachers are adept at using digital technologies to communicate, access, and manage information effectively. The consistency of scores across indicators suggests that teachers are not only capable of operating digital tools but also of integrating them meaningfully into instructional settings.

The very high digital literacy levels of teachers carry important implications for teaching quality, instructional innovation, and student learning experiences. High competency in communication and collaboration suggests that teachers are equipped to sustain technology-supported learning environments that enhance interaction, feedback, and resource sharing. Strong digital content creation skills also imply teachers' capacity to design multimedia learning materials, which are essential for boosting student engagement and accommodating diverse learning styles. Meanwhile, high proficiency in safety and security indicates that teachers can model responsible digital citizenship and ensure safe learning environments, an increasingly important expectation given the growing reliance on online tools. Additionally, their competence in basic troubleshooting ensures instructional continuity, minimizing disruptions during technology-mediated lessons. Collectively, these findings imply that teachers are well-positioned to implement technology-enhanced pedagogies aligned with 21st-century learning frameworks.

In summary, the findings clearly show that the teacher-respondents exhibit very high digital literacy skills across all assessed areas, indicating strong readiness to integrate digital tools into their teaching practices. Their high competence suggests that schools benefit from a digitally capable teaching workforce that can support effective, engaging, and safe technology-enhanced instruction. While the results are positive, they also underscore the importance of sustaining professional development programs to maintain and further enhance these competencies, especially as educational technologies continue to evolve. Overall, the data confirm that teachers are digitally proficient and well-equipped to contribute to improved instructional quality in contemporary, technology-driven learning environments.

Statements	**Mean**	**Interpretation**
Information and Data Literacy		
1. I can efficiently search for relevant educational materials online.	3.8	Very High
2. I can evaluate the credibility and reliability of digital resources before using them in teaching.	3.76	Very High
3. I can organize digital information and resources for easy access during lessons.	3.78	Very High
4. I can use digital tools to analyze and interpret student data for instructional planning.	3.74	Very High
5. I can integrate digital information effectively to enhance lesson content.	3.77	Very High
Mean	3.77	Very High
Communication and Collaboration		
6. I use digital platforms to communicate effectively with students and colleagues.	3.79	Very High
7. I can collaborate with other teachers using online tools and applications.	3.75	Very High
8. I encourage students to participate in discussions through digital communication platforms.	3.76	Very High
9. I can provide students with prompt feedback using digital tools.	3.77	Very High
10. I can share instructional materials and resources with colleagues through digital platforms.	3.78	Very High

Mean	3.77	Very High
Digital Content Creation		
16. I can design digital learning materials, including presentations, worksheets, and videos.	3.76	Very High
17. I can edit and adapt digital content to suit my students' learning needs.	3.74	Very High
18. I can use digital tools to create interactive learning activities for my students.	3.78	Very High
19. I can develop multimedia content to make lessons more engaging.	3.77	Very High
20. I can produce instructional materials in various digital formats to support learning objectives.	3.75	Very High
Mean	3.76	Very High
Safety and Security		
21. I am aware of safe practices when using the internet and digital platforms.	3.80	Very High
22. I can protect my students' personal information when using digital tools.	3.78	Very High
23. I follow ethical guidelines in using and sharing digital content.	3.77	Very High
24. I can identify and prevent potential cyber threats or security risks in my classroom.	3.75	Very High
25. I ensure that students use online learning platforms responsibly and safely.	3.76	Very High
Mean	3.77	Very High
Basic Troubleshooting		
26. I can resolve common technical problems with digital devices used in teaching.	3.74	Very High
27. I can troubleshoot software and application issues that arise during lessons.	3.76	Very High
28. I can assist students in resolving basic technical difficulties with digital tools.	3.77	Very High
29. I can manage minor network or connectivity issues during online or blended instruction.	3.75	Very High
30. I can quickly adapt when technical problems interrupt classroom activities.	3.78	Very High
Mean	3.76	Very High
Overall Mean	3.77	Very High

Range	**Interpretation**
1.00 – 1.74	Very Low
1.75 – 2.49	Low
2.50 – 3.24	High
3.25 – 4.00	Very High

Level of students' academic achievement

The results indicate that the majority of students fall within the "Very Satisfactory" achievement level, with 78 out of 130 learners (89.3%) obtaining grades between 85 and 89. A smaller proportion, 52 learners (10.7%), reached the "Outstanding" level, achieving grades of 90 and above. The computed mean score of 87.80 places the overall academic performance within the "Very Satisfactory" range, suggesting that the learners consistently meet or exceed expected

competencies. The relatively low standard deviation (S.D. = 2.65) also indicates that the students' performance is fairly homogeneous, with minimal variation in grades across the sample.

These findings imply that the learners, as a group, are performing at a high academic level, demonstrating mastery of most of the learning competencies expected of them. The dominance of the Very Satisfactory category suggests strong instructional delivery and effective learning support mechanisms within the schools involved. However, the relatively small percentage of learners attaining Outstanding performance may signal opportunities for enrichment, differentiation, or more advanced learning interventions to further elevate achievement among higher-performing students. Overall, the data reflect a stable and commendable student performance profile, positioning the group well for continuous academic growth.

Learners' Academic Achievement	**Frequency (n=130)**	**Percentage**
Outstanding (90 and above)	52	10.7
Very Satisfactory (85 to 89)	78	89.3
Mean = 87.80	**S.D. = 2.65**	

Relationship between teachers' digital literacy skills and students' academic achievement

Across all five dimensions, teachers' digital literacy demonstrates a positive and statistically significant association with learners' academic achievement. The correlation coefficients fall within a moderately strong range, from 0.541 to 0.653, indicating that higher teacher digital competence is reliably aligned with better student performance. Within this overall result, digital content creation emerges as the strongest contributor (coeff = 0.653), followed by communication and collaboration (coeff = 0.621), troubleshooting (coeff = 0.603), information and data literacy (coeff = 0.582), and safety and security (coeff = 0.541). This unified trend, derived using Pearson's correlation coefficient, suggests that teachers who are more proficient in designing digital materials, communicating effectively through technology, and managing digital tools are better positioned to support enhanced learner outcomes.

This implies that the pattern of coefficients highlights specific instructional levers that schools can strategically prioritize to enhance student achievement. Because digital content creation demonstrates the strongest association with academic outcomes, targeted professional development that equips teachers to design multimedia materials, interactive activities, and assessment-aligned digital resources is likely to yield substantial gains in learning performance. Likewise, the strong relationship observed for communication and collaboration underscores the importance of technology-mediated feedback, discussions, and co-creation processes that help sustain student engagement and address misconceptions in real time. The significant correlations involving troubleshooting and information and data literacy further suggest that teachers who can quickly resolve technical issues and analyze student data are better able to maintain instructional continuity and tailor support to diverse learning needs. Although safety and security have the lowest yet significant coefficient, they reinforce that responsible, ethical, and safe digital practices

remain essential for fostering a stable environment where academic achievement can thrive. Collectively, these results point to a balanced capacity-building agenda that strengthens creative, communicative, and operational digital competencies to keep technology-enhanced learning effective and uninterrupted.

The present associations align with prior evidence that technology-related competencies are linked with stronger academic outcomes. Li et al. (2025) reported a positive relationship between digital literacy and achievement, reinforcing the proposition that digitally supported learning environments bolster performance. Widowati et al. (2023) likewise found that digital literacy elevates student engagement and achievement, suggesting a plausible pathway whereby teacher-enabled, technology-rich instruction promotes deeper participation that translates into performance gains. At the teacher level, Reyes (2025) documented a moderate, significant relationship between teachers' digital competence and students' academic achievement in tertiary settings, mirroring the present study's positive coefficients across dimensions. Complementing this, Dagohoy and Hinacay (2025) showed that teachers' digital readiness and orientation is significantly associated with students' performance, consistent with the current finding that multiple facets of teacher digital literacy relate to stronger learner outcomes. Moreover, prior work also suggests indirect pathways through engagement and motivation, which resonates with the stronger coefficients observed for the more instructionally proximal dimensions.

In sum, this provides coherent and convergent evidence that teachers' digital literacy, especially content creation and communication or collaboration, is meaningfully related to learners' academic achievement. The magnitude and consistency of the coefficients across all five domains strengthen the case for investing in targeted professional development that equips teachers to design high-quality digital learning experiences, communicate effectively through technology, and sustain uninterrupted instruction through sound troubleshooting and data use. These results offer actionable guidance for school leaders and policymakers seeking to leverage teacher digital competence as a practical route to improved student performance.

Variable	Coefficient	p-value	Statistical Inference
Information and Data Literacy * Learners' Academic Achievement	0.582	0.001	Significant
Communication and Collaboration * Learners' Academic Achievement	0.621	0.001	Significant
Digital Content Creation * Learners' Academic Achievement	0.653	0.001	Significant
Safety and Security * Learners' Academic Achievement	0.541	0.001	Significant
Troubleshooting * Learners' Academic Achievement	0.603	0.001	Significant

*Tested using Pearson Correlation at 0.005 level of significancehe

IV. Conclusion

The study's findings reveal that teachers possess very high levels of digital literacy across all five dimensions—information and data literacy, communication and collaboration, digital content creation, safety and security, and troubleshooting—as evidenced by the overall mean of 3.77. Correspondingly, students' academic achievement falls within the Very Satisfactory range, with a mean grade of 87.80, indicating strong and consistent performance among learners. Furthermore, results demonstrate a significant positive relationship between teachers' digital literacy skills and students' academic achievement, with correlation coefficients ranging from 0.541 to 0.653 across all domains, with the strongest in digital content creation, communication, and collaboration. These findings collectively answer the research questions by establishing that teachers exhibit very high digital literacy, students show commendable academic performance, and teacher digital literacy significantly influences learner achievement, highlighting the critical role of digitally competent educators in enhancing student outcomes.

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