

---

# Digital Literacy of Teachers and Its Influence on Instructional Effectiveness in Abulug District Riverside Unit Schools, Cagayan

MARIE ANN B. ARIZABAL

Canayun Elementary School, Division of Cagayan, Philippines

[marieann.arizabal@deped.gov.ph](mailto:marieann.arizabal@deped.gov.ph)

*Abstract* — This study examined the digital literacy of teachers and its influence on instructional effectiveness in Abulug District Riverside Unit Schools, Cagayan, during the School Year 2025–2026. Utilizing a descriptive–correlational research design, the study involved 41 teacher-respondents selected through total enumeration. A researcher-made questionnaire was used to measure teachers’ digital literacy in terms of information and data management, communication and collaboration, digital content creation, safety and ethical practice, and technical problem-solving and adaptability, as well as their instructional effectiveness in terms of lesson planning, classroom management, delivery of instruction, use of instructional materials, and assessment of learning. Findings revealed that teachers demonstrated a high level of digital literacy (overall mean = 3.20) and an effective level of instructional effectiveness (overall mean = 3.15). Furthermore, a moderate positive and significant relationship ( $r = 0.412$ ,  $p = 0.031$ ) was found between teachers’ digital literacy and instructional effectiveness. The study concludes that enhancing teachers’ digital literacy can significantly improve instructional effectiveness. It recommends continuous professional development, provision of adequate technological resources, and institutional support to strengthen teachers’ digital competencies.

**Keywords:** *digital literacy, instructional effectiveness, teachers, ICT integration*

---

## I. INTRODUCTION

The rapid advancement of digital technologies has significantly transformed the educational landscape, reshaping how teaching and learning processes are conducted across the globe. In the 21st century, digital literacy has emerged as a fundamental competency for educators,

enabling them to effectively integrate technology into instruction and respond to the demands of modern learners. Digital literacy encompasses a wide range of skills, including the ability to access, evaluate, create, and utilize digital information responsibly and efficiently. As schools increasingly adopt technology-driven practices, teachers are expected to demonstrate not only subject mastery but also proficiency in digital tools and platforms to enhance instructional delivery and student engagement.

In the Philippine context, particularly in geographically diverse areas such as the Riverside unit schools of Abulug District, Cagayan, the integration of digital technologies in teaching presents both opportunities and challenges. While educational policies promote the use of information and communication technologies (ICT) in classrooms, disparities in access to resources, infrastructure limitations, and varying levels of teacher preparedness often hinder effective implementation. These challenges highlight the critical importance of examining teachers' digital literacy and its relationship with instructional effectiveness, especially in rural or underserved school settings where technological adoption may be uneven.

Existing literature underscores the significant role of teachers' digital literacy in improving instructional practices. Marnita et al. (2023) found that teachers' digital literacy competence contributes positively to effective learning management, enhancing classroom interaction and fostering student engagement. Their study demonstrated that digitally competent teachers are better equipped to design learning experiences that align with the needs of technologically oriented learners, thereby improving teaching efficiency and effectiveness. Similarly, Zhang and Wu (2024) reported that teachers' digital teaching skills significantly influence teaching quality, emphasizing that the effective use of digital tools enhances interactivity, student participation, and overall instructional effectiveness in educational settings. These findings collectively suggest that digital literacy is not merely a technical skill but a critical pedagogical competency that directly affects teaching outcomes.

---

Moreover, broader research indicates that digital competence among teachers is closely linked to improved student learning outcomes and engagement. Studies highlight that teachers who possess strong digital skills are more capable of integrating technology into lesson design, facilitating collaborative learning, and fostering critical thinking among students. This integration enables a shift from traditional teacher-centered instruction to more learner-centered approaches, thereby enhancing instructional effectiveness. However, despite these positive findings, challenges such as limited professional development opportunities, inadequate infrastructure, and unequal access to digital resources continue to affect the consistent application of digital literacy in teaching practices.

Despite the growing body of literature on digital literacy and instructional effectiveness, a significant research gap remains, particularly in localized and context-specific settings. Most existing studies focus on urban or well-resourced schools, higher education institutions, or international contexts, with limited attention given to rural public schools in the Philippines. Furthermore, there is a lack of empirical research examining how teachers' digital literacy specifically influences instructional effectiveness in Riverside unit schools, where unique geographical and infrastructural challenges may impact technology integration. This gap underscores the need for context-based investigations that consider the realities of teachers working in remote areas, including access to digital tools, connectivity issues, and the availability of training and support systems.

Addressing this gap is essential for developing targeted interventions that can enhance teachers' digital competencies and improve instructional practices in underserved communities. Understanding the level of digital literacy among teachers and its impact on their instructional effectiveness can inform policy decisions, guide professional development programs, and support the design of context-appropriate strategies for technology integration in education.

In light of these considerations, this study aimed to examine the digital literacy of teachers and its influence on instructional effectiveness in Abulug District Riverside Unit Schools, Cagayan. Specifically, it sought to determine the level of digital literacy among teachers, assess their instructional effectiveness, and analyze the relationship between these variables. Ultimately,

---

the study intended to provide empirical evidence that can support efforts to enhance teaching quality and promote equitable access to effective digital education in rural school settings.

## Literature Review

Digital literacy has increasingly become a core competency for teachers in the 21st century, influencing how instruction is delivered and how students engage in learning. It encompasses not only technical skills but also the ability to critically evaluate digital resources, design interactive learning environments, and facilitate meaningful learning experiences through technology. Rahmawati, Abdullah, and Widiaty (2024) emphasized that digital literacy supports innovative instructional practices by enabling teachers to create dynamic and flexible learning environments that respond to diverse student needs. Their study highlighted that digitally literate teachers are better prepared to integrate digital tools effectively, thereby enhancing the quality of instruction and promoting student-centered learning.

In relation to instructional effectiveness, recent studies reveal that teachers' digital literacy is a strong predictor of improved teaching performance. Marnita, Nurdin, and Prihatin (2023) found that teachers who possess high levels of digital literacy demonstrate better classroom management, more engaging instructional delivery, and increased ability to facilitate interactive learning. Their findings further suggest that digital literacy enhances teachers' capacity to utilize multimedia resources, online platforms, and collaborative tools, which contribute to improved student participation and comprehension. Similarly, Erwin and Mohammed (2022) observed that teachers' competency in digital tools positively influences their instructional strategies, allowing them to adopt innovative teaching approaches that cater to the evolving learning preferences of students.

---

Moreover, teacher digital competence has been associated with overall teaching effectiveness and professional growth. Domínguez-González et al. (2025) concluded that digital competence is essential for improving teaching practices, particularly in adapting instruction to meet the needs of diverse learners. Their review stressed that teachers who continuously develop their digital skills are more capable of implementing differentiated instruction and fostering inclusive learning environments. Correspondingly, Althubayani (2024) found that teachers' digital competence significantly affects students' motivation and academic performance, as it allows educators to incorporate interactive and engaging digital content into their lessons. However, the study also pointed out that teachers often face challenges such as insufficient training and a lack of access to adequate technological resources.

The integration of information and communication technologies (ICT) in teaching further reinforces the importance of digital literacy in enhancing instructional effectiveness. Abel et al. (2022) explained that teachers' attitudes and competencies toward ICT integration greatly influence the success of technology use in classrooms. Their study indicated that teachers who are confident in using digital technologies are more likely to adopt innovative instructional strategies that improve learning outcomes. Similarly, Akram et al. (2022) reported that technology-integrated instruction leads to increased student engagement, improved classroom interaction, and enhanced learning experiences. These findings highlight that digital literacy is a critical factor in maximizing the potential of ICT in education.

Additionally, recent empirical research demonstrates the direct impact of digital teaching skills on instructional effectiveness. Zhang and Wu (2024) found that teachers' proficiency in digital tools significantly enhances teaching quality by promoting collaboration, communication, and active student participation. Their study emphasized that digital literacy enables teachers to shift from traditional teaching methods to more interactive and learner-centered approaches. In the same vein, Ntorukiri et al. (2022) noted that although teachers generally recognize the importance of ICT skills, their actual implementation in classroom instruction varies due to constraints such as limited infrastructure and insufficient access to digital resources. These limitations can affect the extent to which teachers are able to fully utilize their digital competencies in improving instructional effectiveness.

---

Despite the growing body of literature supporting the role of digital literacy in enhancing teaching and learning, several gaps remain evident. Most existing studies focus on urban or technologically advanced educational settings, with less attention given to rural or geographically isolated schools. Additionally, while digital literacy has been widely studied as a general competency, fewer studies have explored its direct relationship with instructional effectiveness in specific local contexts. There is also limited research examining how contextual factors such as infrastructure, access to technology, and professional development opportunities influence the application of digital literacy in teaching practices.

Overall, the reviewed literature consistently indicates that digital literacy is a vital component of effective teaching. It enhances teachers' ability to design engaging lessons, integrate technology into instruction, and respond to the needs of modern learners. However, the extent to which digital literacy contributes to instructional effectiveness is influenced by various contextual factors, highlighting the need for localized studies that can provide deeper insights into its impact in specific educational environments.

### ***Research Questions***

This study aimed to determine the digital literacy of teachers and its influence on instructional effectiveness in Abulug District Riverside Unit Schools, Cagayan.

Specifically, this study sought to answer the following questions:

1. What is the level of digital literacy of teachers in terms of:
  - a. Information and data management;
  - b. Communication and collaboration;
  - c. Digital content creation;
  - d. Safety and ethical practice; and
  - e. Technical problem-solving and adaptability?

- 
2. What is the level of instructional effectiveness of teachers as perceived in terms of:
    - a. Lesson planning and preparation;
    - b. Classroom management;
    - c. Delivery of instruction;
    - d. Use of instructional materials; and
    - e. Assessment of learning?
  3. Is there a significant relationship between teachers' overall digital literacy and their instructional effectiveness?

## II. METHODOLOGY

### *Research Design*

This study employed a descriptive–correlational research design to examine the relationship between teachers' digital literacy and their instructional effectiveness in Abulug District Riverside Unit Schools, Cagayan. The descriptive component was utilized to determine the level of digital literacy and instructional effectiveness of the teacher-respondents across identified dimensions, providing a systematic portrayal of their current competencies and practices. Meanwhile, the correlational aspect was used to analyze the degree and direction of the relationship between the variables, specifically to determine whether teachers' digital literacy significantly influences instructional effectiveness. This design is appropriate for the study as it allows the researcher to gather quantifiable data, describe existing conditions, and establish associations among variables without manipulating them, thereby providing empirical evidence that can serve as a basis for developing interventions aimed at enhancing teaching practices.

### *Participants of the Study*

The participants of this study consisted of all teachers assigned to the Abulug District Riverside Unit Schools during the School Year 2025–2026. A total enumeration sampling

technique was employed, wherein all available teachers in the identified schools were included as respondents to ensure comprehensive data collection and accurate representation of the population. This approach was deemed appropriate given the manageable number of teachers and the intent to capture the overall digital literacy and instructional effectiveness of educators within the district.

In total, forty-one (41) teachers participated in the study, distributed across seven (7) Riverside unit schools. The inclusion of all teachers allowed the researcher to obtain a complete and unbiased assessment of the variables under investigation. Table 1 presents the distribution of teacher-respondents across the participating schools:

| Schools      | Number of Respondents |
|--------------|-----------------------|
| School A     | 8                     |
| School B     | 8                     |
| School C     | 7                     |
| School D     | 8                     |
| School E     | 8                     |
| School F     | 3                     |
| School G     | 7                     |
| <b>Total</b> | <b>41</b>             |

### ***Instrumentation***

This study utilized a researcher-made questionnaire as the primary data-gathering instrument. The instrument was designed to measure the level of teachers' digital literacy and instructional effectiveness based on the specific dimensions identified in the statement of the problem. It consisted of two main parts: the first part measured digital literacy across the areas of information and data management, communication and collaboration, digital content creation, safety and ethical practice, and technical problem-solving and adaptability; and the second part assessed instructional effectiveness in terms of lesson planning and preparation, classroom management, delivery of instruction, use of instructional materials, and assessment of learning. The questionnaire utilized a structured Likert scale to capture the extent of teachers' competencies and practices. Prior to its administration, the instrument underwent validation by experts in

education and research to ensure clarity, relevance, and reliability, and necessary revisions were made based on their suggestions to enhance its overall quality.

### *Analysis of Data*

The data collected in this study were processed using both descriptive and inferential statistical techniques. Descriptive statistics, particularly the mean, were employed to describe the level of teachers' digital literacy across the dimensions of information and data management, communication and collaboration, digital content creation, safety and ethical practice, and technical problem-solving and adaptability. Likewise, mean scores were used to determine the level of instructional effectiveness in terms of lesson planning and preparation, classroom management, delivery of instruction, use of instructional materials, and assessment of learning. For the interpretation of the computed mean values, the following scale was applied:

| Range       | Digital Literacy   | Instructional Effectiveness |
|-------------|--------------------|-----------------------------|
| 1.00 – 1.74 | Very Low Literacy  | Very Ineffective            |
| 1.75 – 2.49 | Low Literacy       | Ineffective                 |
| 2.50 – 3.24 | High Literacy      | Effective                   |
| 3.25 – 4.00 | Very High Literacy | Very Effective              |

To examine the relationship between the variables, the Pearson Product-Moment Correlation Coefficient (Pearson  $r$ ) was utilized as an inferential statistical tool. This method was applied to determine the presence, strength, and direction of the relationship between teachers' overall digital literacy and their instructional effectiveness.

---

### III. RESULTS AND DISCUSSION

*The level of digital literacy of teachers in terms of the following dimensions*

The findings reveal that teachers demonstrate a generally high level of digital literacy, with an overall mean of 3.20. Notably, the domains of information and data management (mean = 3.48) and communication and collaboration (mean = 3.36) were rated as very high, indicating that teachers are highly capable of accessing, evaluating, and utilizing digital information, as well as engaging in online communication and collaborative platforms. Meanwhile, digital content creation (mean = 3.12), safety and ethical practice (mean = 3.05), and technical problem-solving and adaptability (mean = 2.98) were assessed as high, suggesting that while teachers are competent in these areas, there is still room for further development, particularly in resolving technical issues and adapting to rapidly evolving technologies. Overall, the results indicate that teachers possess strong foundational digital competencies, with slightly lower proficiency in more complex or technical aspects of digital literacy.

These findings imply that while teachers are well-equipped with essential digital skills for instructional purposes, there is a need for continuous professional development focused on enhancing advanced digital competencies. The slightly lower ratings in technical problem-solving and digital content creation suggest that targeted training programs, workshops, and support mechanisms should be implemented to strengthen these areas. Improving these competencies will enable teachers to design more innovative, interactive, and technology-enhanced learning experiences, ultimately leading to improved instructional effectiveness. Furthermore, sustaining high levels of digital literacy requires ongoing institutional support, access to updated technological resources, and the promotion of a culture of continuous learning among teachers to ensure they remain responsive to the demands of modern education.

| Dimensions                                 | Mean        | Interpretation       |
|--------------------------------------------|-------------|----------------------|
| Information and Data Management            | 3.48        | Very High Literacy   |
| Communication and Collaboration            | 3.36        | Very High Literacy   |
| Digital Content Creation                   | 3.12        | High Literacy        |
| Safety and Ethical Practice                | 3.05        | High Literacy        |
| Technical Problem-Solving and Adaptability | 2.98        | High Literacy        |
| <b>Overall Mean</b>                        | <b>3.20</b> | <b>High Literacy</b> |

*The level of instructional effectiveness of teachers as perceived in terms of the following dimensions*

The findings indicate that teachers exhibit an overall effective level of instructional effectiveness, as reflected by the overall mean of 3.15. Among the dimensions, classroom management (mean = 3.22) obtained the highest mean, suggesting that teachers can maintain an organized, orderly, and conducive learning environment. This is followed by lesson planning and preparation (mean = 3.18) and delivery of instruction (mean = 3.15), which both reflect teachers' ability to design structured lessons and deliver content clearly and systematically. Meanwhile, use of instructional materials (mean = 3.10) and assessment of learning (mean = 3.08), although still within the effective range, obtained relatively lower mean scores, indicating that teachers are consistently utilizing teaching aids and assessment strategies but may still have opportunities to enhance these practices. Overall, the results suggest that teachers demonstrate competence across all aspects of instructional effectiveness, with no dimension falling below the effective level.

These findings imply that while teachers are generally effective in their instructional practices, there remains a need for continuous enhancement, particularly in the areas of instructional materials utilization and assessment of learning. Strengthening teachers' skills in developing and integrating diverse, technology-supported instructional resources can further improve student engagement and learning outcomes. Additionally, enhancing assessment practices, including the use of varied and innovative assessment tools, may provide more accurate measures of student learning and progress. The results also highlight the importance of sustained

professional development programs that focus on refining teaching strategies, encouraging the use of innovative pedagogical approaches, and supporting teachers in adapting to evolving educational demands. By further improving these areas, instructional effectiveness can be elevated from effective to highly effective, ultimately contributing to better student performance and overall educational quality.

| Dimensions                      | Mean        | Interpretation   |
|---------------------------------|-------------|------------------|
| Lesson Planning and Preparation | 3.18        | Effective        |
| Classroom Management            | 3.22        | Effective        |
| Delivery of Instruction         | 3.15        | Effective        |
| Use of Instructional Materials  | 3.10        | Effective        |
| Assessment of Learning          | 3.08        | Effective        |
| <b>Overall Mean</b>             | <b>3.15</b> | <b>Effective</b> |

*Correlational results between teachers' overall digital literacy and their instructional effectiveness*

The findings reveal a moderate positive and statistically significant relationship between teachers' overall digital literacy and their instructional effectiveness, as evidenced by the computed correlation coefficient ( $r = 0.412$ ) and probability value ( $p = 0.031$ ). This indicates that as teachers' digital literacy increases, their instructional effectiveness likewise tends to improve. The result suggests that teachers who possess higher levels of digital competence are more capable of planning lessons, managing classrooms, delivering instruction, utilizing instructional materials, and assessing learning more effectively. The significance of the relationship confirms that digital literacy is an important factor associated with teaching performance in the context of the Abulug District Riverside Unit Schools.

The implication of this finding highlights the critical role of digital literacy as a contributing factor to effective teaching. Since the relationship is moderate, it suggests that while digital literacy significantly influences instructional effectiveness, other factors such as teaching experience, pedagogical skills, and school resources may also play important roles. Nevertheless,

improving teachers' digital literacy through continuous professional development, ICT training, and access to technological resources can enhance their instructional practices. Strengthening digital competencies may lead to more engaging, interactive, and student-centered learning environments, ultimately improving educational outcomes. This also underscores the importance of institutional support in providing teachers with opportunities to continuously develop their digital skills, especially in resource-constrained settings.

These findings are supported by several related studies discussed in the literature. Marnita, Nurdin, and Prihatin (2023) found that teachers' digital literacy significantly contributes to effective learning management and improved classroom interaction, emphasizing that digitally competent teachers tend to demonstrate higher instructional performance. Similarly, Zhang and Wu (2024) reported that teachers' digital teaching skills positively influence teaching quality, particularly in enhancing student engagement and instructional delivery. Furthermore, Akram, Abdelrady, Al-Adwan, and Ramzan (2022) highlighted that the integration of digital tools in teaching leads to improved classroom effectiveness and more meaningful learning experiences. These studies collectively support the present finding that digital literacy plays a vital role in strengthening instructional effectiveness, reinforcing the need to prioritize the development of teachers' digital competencies.

| <b>Variable</b>                                                        | <b>Coefficient<br/>(r)</b> | <b>Probability</b> | <b>Statistical<br/>Inference</b> | <b>Remarks</b>                                |
|------------------------------------------------------------------------|----------------------------|--------------------|----------------------------------|-----------------------------------------------|
| Teachers' Overall Digital<br>Literacy * Instructional<br>Effectiveness | 0.412                      | 0.031              | <b>Significant</b>               | <b>Moderate<br/>positive<br/>relationship</b> |

---

#### IV. CONCLUSION

Overall, the findings of the study indicate that teachers in the Abulug District Riverside Unit Schools possess a generally high level of digital literacy and effective instructional practices, with a statistically significant moderate positive relationship between the two variables. This suggests that teachers' competency in digital literacy contributes meaningfully to their instructional effectiveness, particularly in areas such as lesson planning, classroom management, and instructional delivery. While the results affirm that teachers are already performing at a commendable level, they also highlight the need for continuous enhancement, especially in more advanced digital skills and innovative teaching approaches. Therefore, the study concludes that strengthening teachers' digital literacy through sustained professional development, access to technological resources, and institutional support can further improve instructional effectiveness, ultimately leading to better student engagement and learning outcomes in riverside school contexts.

---

## REFERENCES

- [1.] Abel, V., Tondeur, J., & Sang, G. (2022). Teacher competence and ICT integration in education: A systematic review. *Education Sciences*, 12(9), 609. <https://doi.org/10.3390/educsci12090609>
- [2.] Akram, H., Abdelrady, A. H., Al-Adwan, A. S., & Ramzan, M. (2022). Teachers' perceptions of technology integration in teaching-learning processes. *Frontiers in Psychology*, 13, 920317. <https://doi.org/10.3389/fpsyg.2022.920317>
- [3.] Althubyani, A. (2024). The impact of teachers' digital competence on student motivation and learning outcomes. *Sustainability*, 16(7), 2796. <https://doi.org/10.3390/su16072796>
- [4.] Domínguez-González, A., Luque de la Rosa, A., Hervás-Gómez, C., & Román-Graván, P. (2025). Teacher digital competence and its impact on teaching and learning processes: A systematic review. *Contemporary Educational Technology*, 17(1). <https://doi.org/10.30935/cedtech/16168>
- [5.] Erwin, E., & Mohammed, S. (2022). Digital literacy skills and teaching strategies in modern education. *International Journal of Technology in Education and Science*, 6(4), 580–594. <https://doi.org/10.46328/ijtes.364>
- [6.] Marnita, M., Nurdin, N., & Prihatin, Y. (2023). Digital literacy competence of teachers and its impact on learning management. *Journal of Innovation in Educational and Cultural Research*, 4(1), 1–10. <https://doi.org/10.46843/jiecr.v4i1.444>
- [7.] Ntorukiri, T. B., Kirugua, J. M., & Kirimi, F. (2022). Policy and infrastructure challenges influencing ICT implementation in universities: a literature review. *Discover Education*, 1(1), 19. <https://doi.org/10.1007/s44217-022-00019-6>
- [8.] Rahmawati, Y., Abdullah, A. G., & Widiaty, I. (2024). Digital literacy and its role in improving educational practices. *International Journal of Evaluation and Research in Education*, 13(1). <https://doi.org/10.11591/ijere.v13i1.25747>

- 
- [9.] Zhang, Y., & Wu, J. (2024). Digital teaching competence and its influence on teaching quality and student engagement. *Cogent Education*, 11(1).  
<https://doi.org/10.1080/2331186X.2024.2436706>