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RESEARCH ARTICLE

Digital Literacy Competence and Instructional Technology Proficiency Among Elementary School Educators : Implications for 21st-Century Teaching Practices

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Abstract

Digital literacy competence and instructional technology proficiency have become essential components of effective 21st-century teaching practices in contemporary education. This study explored the digital literacy competence and instructional technology proficiency among elementary school educators in Santa Maria, Isabela. Anchored on the Technological Pedagogical Content Knowledge (TPACK) Framework and Constructivist Learning Theory, the study employed a descriptive qualitative research design to examine teachers' digital experiences, instructional technology practices, classroom integration strategies, and challenges in technology-enhanced instruction. Participants included selected elementary school educators from public schools in Santa Maria, Isabela. Data were gathered through semi-structured interviews, focus group discussions, classroom observations, and document analysis. Braun and Clarke's (2006) thematic analysis approach was utilized in analyzing the gathered data. Findings revealed that teachers utilize digital platforms, multimedia resources, online learning applications, and technology-assisted instructional strategies to improve learner engagement, classroom participation, and instructional delivery. Participants emphasized that digital literacy competence enhances classroom interaction, instructional creativity, communication efficiency, and access to learning resources. The findings further revealed that teachers continuously adapt to emerging educational technologies through self-directed learning, peer collaboration, and professional development initiatives. However, challenges such as unstable internet connectivity, limited technological resources, inadequate training opportunities, varying digital competencies, and workload demands significantly affect instructional technology integration. The study concludes that digital literacy competence and instructional technology proficiency significantly contribute to innovative and learner-centered teaching practices in elementary education. Strengthening technological infrastructure, continuous professional development, digital support systems, and institutional technology programs is recommended to improve instructional technology integration and 21st-century teaching practices among educators.

Keywords: Digital literacy competence , instructional technology proficiency, 21st-Century Teaching Practices, instructional technology integration

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Introduction

The rapid advancement of digital technology has transformed educational systems and instructional practices across the world. In contemporary education, teachers are expected not only to possess content knowledge and pedagogical competence but also to demonstrate digital literacy and instructional technology proficiency necessary for effective 21st-century teaching practices. Technology integration has become increasingly important in improving learner engagement, communication, collaboration, creativity, and access to educational resources within classroom instruction.

Digital literacy competence refers to educators' ability to effectively access, evaluate, utilize, create, and communicate information using digital technologies and online platforms. Instructional technology proficiency, on the other hand, refers to teachers' competence in integrating digital tools, multimedia resources, online applications, and technology-assisted instructional strategies within teaching and learning processes.

In elementary education, instructional technology integration provides opportunities for interactive learning, collaborative participation, differentiated instruction, and meaningful learner engagement. Digital tools such as multimedia presentations, educational videos, online learning applications, interactive platforms, and communication technologies help improve instructional delivery and support diverse learner needs. Teachers who demonstrate strong digital literacy competence become more capable of facilitating innovative, learner-centered, and technology-enhanced learning experiences.

Within the Philippine educational context, the Department of Education continuously emphasizes the integration of information and communication technology (ICT) and digital literacy development under the K–12 curriculum and educational modernization programs. The increasing implementation of blended learning, online learning platforms, and digital instructional approaches further highlights the importance of strengthening teachers' digital competencies and instructional technology proficiency.

However, despite the growing importance of educational technology, elementary school educators continue to encounter various challenges related to technology integration and digital instruction. Teachers often experience concerns regarding unstable internet connectivity, insufficient technological resources, inadequate ICT training, varying digital competencies, and increased workload demands associated with technology-enhanced instruction. These challenges become more significant in rural and resource-limited educational settings where access to digital infrastructure and technological support remains limited.

In Santa Maria, Isabela, elementary school educators continuously adapt to evolving educational technologies and digital teaching demands. Teachers utilize various digital tools and instructional technologies to improve classroom participation and instructional effectiveness while navigating institutional and technological challenges within their educational environment.

Several studies emphasized that digital literacy competence positively influences instructional innovation, learner engagement, and classroom effectiveness. Mishra and Koehler (2019) explained that effective technology integration requires the interaction of technological, pedagogical, and content knowledge among educators. Similarly, Ertmer and Ottenbreit-Leftwich (2020) argued that teachers' digital competence and technological confidence significantly affect technology integration and instructional quality.

Although digital literacy and technology integration have been widely discussed in educational literature, there remains limited qualitative research exploring the lived instructional experiences and technological competencies of elementary school educators within rural Philippine educational contexts. Thus, this study aimed to explore digital literacy competence and instructional technology proficiency among elementary school educators in Santa Maria, Isabela and examine its implications for 21st-century teaching practices.

Theoretical Framework

This study was anchored on the Technological Pedagogical Content Knowledge (TPACK) Framework by Mishra and Koehler (2019) and Constructivist Learning Theory by Vygotsky (1978).

The TPACK Framework posits that effective technology integration in education requires the interaction of technological knowledge, pedagogical knowledge, and content knowledge. Teachers become more effective in technology-enhanced instruction when they demonstrate competence in integrating digital tools with pedagogical approaches and subject content.

Constructivist Learning Theory explains that learning occurs through interaction, collaboration, meaningful experiences, and active participation. Technology-enhanced learning environments support learner-centered instruction and meaningful engagement through interactive and collaborative educational experiences.

These theories provided the framework for understanding how digital literacy competence and instructional technology proficiency influence instructional practices and classroom engagement among elementary educators.

Objectives of the Study

This study aimed to explore digital literacy competence and instructional technology proficiency among elementary school educators in Santa Maria, Isabela. Specifically, it sought to examine teachers' digital literacy experiences and instructional technology practices and identify technology-assisted instructional approaches that contribute to learner engagement and effective classroom instruction. The study further aimed to explore how educators integrate digital tools and educational technologies in 21st-century teaching practices. Additionally, it intended to identify the challenges encountered by educators in digital literacy development and instructional technology integration. Finally, the study aimed to derive insights from the participants' experiences that may serve as basis for strengthening digital literacy competence and instructional technology proficiency among elementary school educators.

Methodology

This study employed a descriptive qualitative research design to explore digital literacy competence and instructional technology proficiency among elementary school educators in Santa Maria, Isabela. The qualitative approach enabled the researcher to gather rich and contextualized descriptions regarding teachers' digital experiences, technology integration practices, instructional strategies, and classroom implementation of educational technologies. Through qualitative inquiry, the study captured the lived experiences of educators and examined how digital literacy competence influences instructional practices and learner engagement within elementary school settings.

The study was conducted in selected public elementary schools in Santa Maria, Isabela, Philippines. These schools operate under the supervision of the Department of Education and serve learners from diverse socio-economic and educational backgrounds.

The participants of the study included selected elementary school educators. Purposive sampling was utilized to select participants who possessed direct experiences and active involvement in technology-enhanced instruction and digital literacy practices. The selected participants represented varying teaching experiences, technological competencies, and classroom contexts.

The study utilized semi-structured interview guides, focus group discussion guides, classroom observation notes, and document analysis checklists as qualitative research instruments. Interview questions focused on digital literacy experiences, instructional technology integration, classroom implementation practices, learner engagement, professional development experiences, and challenges encountered in technology-enhanced instruction.

Prior to data gathering, permission was secured from school administrators and ethical considerations including informed consent, confidentiality, anonymity, and voluntary participation were strictly observed throughout the study. Data were gathered through interviews, focus group discussions, classroom observations, and document analysis. All interviews and discussions were audio-recorded with participants' consent and transcribed verbatim for analysis.

The gathered data were analyzed using Braun and Clarke's (2006) thematic analysis approach. Significant statements and recurring patterns were identified, coded, categorized, and organized into themes representing digital literacy competence and instructional technology proficiency among educators. Trustworthiness was established through triangulation, member checking, audit trails, and thick description to ensure credibility and dependability of the findings.

Results and Discussion

Theme 1: Digital Literacy Competence Enhances Instructional Creativity and Learner Engagement

The findings revealed that digital literacy competence significantly contributes to teachers' instructional creativity, classroom innovation, and learner engagement in elementary education. Participants consistently emphasized that digital tools and online resources help improve instructional delivery, classroom interaction, and learner participation during classroom instruction.

One teacher participant stated:

"Mas nagiging interactive at engaging ang lessons kapag gumagamit kami ng technology."

Another participant shared:

"Malaking tulong ang multimedia presentations at videos para mas maintindihan ng learners ang lesson."

Similarly, another teacher explained:

"Mas interesado ang learners kapag gumagamit kami ng digital activities at educational apps."

These responses indicate that digital literacy competence positively influences instructional effectiveness and learner engagement. Teachers become more capable of designing interactive, learner-centered, and visually engaging instructional experiences through technology integration.

Participants also emphasized that technology-enhanced instruction improves learners' attentiveness and classroom participation.

One teacher participant stated:

"Kapag technology-assisted ang lesson, mas active at participative ang learners."

Another participant explained:

"Mas nae-engganyo silang sumali kapag gumagamit ng digital tools."

The findings suggest that digital literacy competence strengthens teachers' instructional flexibility and creativity in facilitating meaningful learning experiences. Technology integration enables teachers to diversify instructional approaches and improve classroom interaction.

The findings support Mishra and Koehler (2019), who emphasized that technological competence strengthens teachers' ability to integrate pedagogy, content knowledge, and digital tools in effective instructional practices. Similarly, Ertmer and Ottenbreit-Leftwich (2020) argued that teachers' digital competence significantly influences learner engagement and instructional innovation.

The findings further align with Constructivist Learning Theory, which posits that interactive and technology-enhanced learning environments strengthen learner participation, collaboration, and meaningful learning experiences (Vygotsky, 1978).

Classroom observations further revealed that learners demonstrated higher levels of attentiveness, participation, and enthusiasm during multimedia-assisted lessons, digital storytelling activities, online quizzes, and technology-supported discussions.

One teacher participant shared:

“Mas buhay at interactive ang classroom kapag may technology integration.”

This finding highlights the importance of digital literacy competence in promoting innovative and learner-centered instructional practices in elementary education.

Theme 2: Technology-Assisted Instruction Strengthens Communication and Access to Learning Resources

The study further revealed that instructional technology proficiency strengthens classroom communication, access to learning materials, and instructional efficiency among elementary educators. Participants explained that digital platforms, online applications, and communication technologies improve instructional preparation, learner interaction, and access to educational resources.

One teacher participant stated:

“Mas madali ang communication at sharing of materials dahil sa technology.”

Another participant shared:

“Nakakatulong ang online resources sa paggawa ng instructional materials.”

Similarly, another teacher explained:

“Mas mabilis naming naihahanda ang lessons gamit ang digital tools.”

These responses indicate that instructional technology proficiency positively influences instructional organization, classroom communication, and resource accessibility. Teachers become more capable of accessing updated educational content and delivering instructional materials efficiently through digital platforms.

Participants also emphasized that technology integration improves collaboration among teachers and learners.

One teacher participant stated:

“Mas nagiging collaborative ang learning activities kapag gumagamit ng technology.”

Another participant explained:

“Nakakatulong din ang online communication sa coordination with learners and parents.”

The findings suggest that instructional technology proficiency contributes significantly to efficient instructional delivery and collaborative classroom environments. Technology-assisted communication enhances interaction among teachers, learners, and educational stakeholders.

The findings support Darling-Hammond et al. (2020), who emphasized that digital instructional technologies improve instructional accessibility, communication efficiency, and collaborative learning opportunities. Similarly, Fullan (2020) argued that educational technology strengthens instructional innovation and access to meaningful learning resources.

The findings further revealed that teachers utilize digital tools for instructional preparation, assessment activities, and learner engagement.

One teacher participant shared:

“Malaking tulong ang technology sa paggawa ng quizzes, presentations, at activities.”

This finding highlights the importance of instructional technology proficiency in strengthening communication systems and instructional efficiency in 21st-century teaching practices.

Theme 3: Continuous Learning and Teacher Adaptability Support Digital Competence Development

The findings revealed that teachers continuously develop their digital literacy competence through self-directed learning, peer collaboration, seminars, webinars, and professional development activities. Participants emphasized that adaptability, willingness to learn, and collaborative support systems help educators cope with evolving technological demands in education.

One teacher participant stated:

"Patuloy kaming natututo dahil mabilis magbago ang technology."

Another participant shared:

"Malaking tulong ang webinars at trainings para ma-improve ang digital skills."

Similarly, another teacher explained:

"Nagtutulungan din kami ng co-teachers sa paggamit ng digital tools."

These responses indicate that continuous learning and collaborative support positively influence teachers' digital competence and instructional confidence. Teachers become more adaptable and technologically proficient through professional development experiences and peer-assisted learning.

Participants also emphasized the importance of self-motivation and adaptability in adjusting to technology-enhanced instruction.

One teacher participant stated:

"Kailangan talagang maging open sa bagong learning at technology."

Another participant explained:

"Unti-unti naming natutunan ang paggamit ng digital platforms."

The findings suggest that teacher adaptability and lifelong learning significantly contribute to digital literacy competence and effective technology integration in elementary classrooms.

The findings support Tondeur et al. (2021), who emphasized that continuous professional development and collaborative learning strengthen teachers' technological competence and instructional confidence. Similarly, Fullan (2020) argued that adaptability and continuous learning are essential in sustaining instructional innovation and educational transformation.

The findings further align with the TPACK Framework, which posits that effective technology integration requires the continuous development of technological, pedagogical, and content knowledge among educators (Mishra & Koehler, 2019).

Participants further revealed that collaborative teacher support systems strengthen confidence in utilizing educational technologies.

One teacher participant shared:

"Mas madali naming natututunan ang technology kapag nagtutulungan kami."

This finding highlights the importance of continuous professional development, collaboration, and adaptability in strengthening digital literacy competence among educators.

Theme 4: Technological Limitations and Workload Challenges Affect Technology Integration

Despite positive technology integration experiences, the findings revealed that elementary educators encounter several challenges affecting digital literacy development and instructional technology implementation. Participants identified unstable internet connectivity, insufficient technological resources, limited ICT equipment, inadequate

training opportunities, varying digital competencies, and workload demands as major barriers to effective technology integration.

One teacher participant stated:

"Challenge talaga ang mahina at unstable na internet connection."

Another participant explained:

"Hindi sapat minsan ang gadgets at technological resources para sa lahat."

Similarly, another teacher shared:

"May mga teachers din na nangangailangan pa ng more training sa technology."

These responses indicate that technological and institutional limitations significantly affect teachers' ability to implement technology-enhanced instruction effectively. Limited infrastructure and insufficient resources create difficulties in sustaining digital instructional practices and classroom innovation.

Participants also emphasized that workload demands affect teachers' ability to continuously improve their digital competencies.

One teacher participant stated:

"Mahirap minsan mag-adjust sa technology dahil sa dami ng workload."

Another participant explained:

"Nakaka-pressure minsan ang paggamit ng bagong platforms at applications."

The findings suggest that technology integration requires adequate institutional support systems, accessible digital infrastructure, and sustained professional development opportunities to improve teachers' instructional technology proficiency.

The findings support OECD (2019), which highlighted that digital infrastructure limitations and teacher workload significantly influence technology integration and instructional effectiveness. Similarly, Ertmer and Ottenbreit-Leftwich (2020) emphasized that institutional support and technological accessibility are essential in sustaining effective educational technology implementation.

Participants further revealed that varying digital competencies among educators affect confidence and instructional consistency.

One teacher participant stated:

"May ibang teachers na nahihirapang sumabay sa mabilis na pagbabago ng technology."

This finding implies the importance of strengthening digital support systems, teacher mentoring programs, and technology training opportunities for educators.

Despite these challenges, participants emphasized their commitment to improving digital literacy competence and instructional technology practices.

One teacher participant shared:

"Patuloy pa rin kaming natututo para mas mapabuti ang pagtuturo gamit ang technology."

This finding highlights the resilience, adaptability, and professional commitment of educators in strengthening technology-enhanced teaching practices despite technological and institutional challenges.

Conclusion

The study revealed that digital literacy competence and instructional technology proficiency significantly contribute to innovative, learner-centered, and engaging teaching practices among elementary school educators in Santa Maria, Isabela. Technology-enhanced instructional approaches such as multimedia integration, online learning applications, digital presentations, and interactive classroom activities strengthen learner participation, communication, and classroom engagement.

The findings further revealed that instructional technology proficiency improves classroom communication, instructional organization, access to learning resources, and collaborative learning opportunities. Teachers become more capable of facilitating meaningful and interactive learning experiences through effective utilization of digital tools and educational technologies.

The study also found that teachers continuously develop their digital competencies through self-directed learning, peer collaboration, professional development activities, and adaptive instructional practices. Teacher adaptability, collaboration, and willingness to learn significantly contribute to technology integration and instructional innovation in elementary classrooms.

However, the findings revealed that unstable internet connectivity, insufficient technological resources, limited training opportunities, workload demands, and varying digital competencies continue to affect technology integration and digital literacy development among educators.

Overall, the study concludes that digital literacy competence and instructional technology proficiency play a significant role in strengthening 21st-century teaching practices, instructional innovation, and learner engagement in elementary education. Strengthening digital infrastructure, professional development programs, institutional support systems, and technology accessibility is essential in improving technology-enhanced instruction among educators.

Implications of the Study

The findings of the study provide important implications for digital literacy development, instructional technology integration, educational leadership, teacher professional development, curriculum implementation, and future research. The study emphasizes the importance of strengthening educators' digital competence and instructional technology proficiency in promoting effective 21st-century teaching practices.

Educational Implications

The findings imply that elementary education should continuously strengthen technology-enhanced instructional practices to improve learner engagement, communication, collaboration, and meaningful participation in classroom learning activities. Teachers may integrate multimedia resources, interactive digital platforms, online learning applications, and technology-assisted instructional strategies to enhance instructional delivery and classroom interaction.

The study further implies that digital literacy competence is essential in promoting innovative and learner-centered educational practices aligned with the demands of 21st-century learning environments.

Additionally, the findings suggest that educational institutions should promote literacy-rich and technology-supported learning environments that encourage meaningful digital participation and collaborative learning experiences.

Pedagogical Implications

The findings imply that teachers play a critical role in facilitating technology-enhanced instruction and meaningful digital learning experiences. Teachers should continuously strengthen technological competence, instructional flexibility, and learner-centered pedagogical approaches in integrating educational technologies within classroom instruction.

The study also highlights the importance of continuous professional development and collaborative learning among educators. Teachers may engage in seminars, webinars, peer mentoring, and self-directed learning opportunities to improve digital literacy competence and instructional confidence.

Furthermore, the findings imply that emotionally supportive and collaborative learning environments strengthen teachers' confidence and willingness to integrate technology in instructional practices.

Institutional and Policy Implications

The findings provide important implications for educational leaders and policymakers within the Department of Education regarding the strengthening of digital literacy programs and instructional technology initiatives in elementary education. Educational institutions may strengthen technology integration by improving internet connectivity, providing technological resources, establishing digital support systems, and implementing continuous ICT training programs for educators.

The study further implies the importance of strengthening institutional support systems that address technological limitations and workload concerns affecting technology integration among teachers.

Moreover, the findings suggest the need for sustainable technology infrastructure and digital transformation programs that support 21st-century teaching practices and educational innovation.

Social Implications

The findings imply that digital literacy competence contributes significantly to teachers' professional growth, instructional effectiveness, and adaptability within evolving educational environments. Technology-enhanced instruction also supports learners' digital competence, communication skills, and preparedness for contemporary learning demands.

The study likewise highlights the importance of collaborative educational communities that encourage knowledge sharing, peer support, and collective professional development among educators.

Implications for Future Research

The findings highlight the need for future studies exploring digital literacy competence and instructional technology integration across different educational contexts and learner populations. Future researchers may conduct comparative studies involving urban and rural schools to examine variations in technology accessibility, digital competence, and instructional practices.

Longitudinal and mixed-methods studies may also be conducted to explore the long-term influence of digital literacy competence on instructional effectiveness, learner engagement, and academic performance.

Future studies may likewise investigate the role of artificial intelligence, digital citizenship, online learning platforms, and emerging educational technologies in strengthening instructional innovation and digital teaching practices.

Overall, the study emphasizes that strengthening digital literacy competence and instructional technology proficiency requires collaborative efforts among educators, school leaders, policymakers, educational institutions, and communities. Continuous professional development, adequate technological infrastructure, institutional support systems, and learner-centered technology integration are essential in promoting effective 21st-century teaching practices in elementary education.

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