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Exploring the Digital Literacy Practices of Mathematics Teachers and Their Perceived Influence on the Academic Performance of Grade 8 Learners: A Qualitative Inquiry

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ABSTRACT

The integration of digital literacy practices in mathematics instruction has become increasingly essential in improving learner engagement and academic performance in contemporary education. This qualitative inquiry explored the digital literacy practices of Mathematics teachers and their perceived influence on the academic performance of Grade 8 learners in Cabagan Integrated School. The study employed a qualitative descriptive research design involving purposively selected Grade 8 Mathematics teachers from public secondary schools. Data were gathered through semi-structured interviews and analyzed using thematic analysis. Findings revealed that teachers utilized digital literacy practices through interactive presentation tools, online learning platforms, video-based instruction, digital assessment applications, and technology-assisted collaborative activities. Participants perceived that these practices improved learners' mathematical understanding, engagement, participation, and problem-solving skills. However, teachers also encountered challenges such as unstable internet connectivity, limited technological resources, insufficient digital competencies among learners, and difficulties in sustaining learner attention in technology-mediated instruction. Despite these challenges, teachers emphasized that digital literacy practices contributed positively to learners' academic performance when appropriately integrated into instruction. The study highlights the importance of strengthening digital pedagogical competence, improving technological infrastructure, and sustaining professional development programs for Mathematics educators.

Keywords: digital literacy, mathematics education, academic performance, digital pedagogy, qualitative inquiry, Grade 8 learners

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Introduction

The rapid advancement of digital technology has significantly transformed educational practices across various learning disciplines, including Mathematics education. In contemporary classrooms, digital literacy has become an essential competency among teachers and learners as educational systems increasingly integrate technology-mediated instruction to improve teaching effectiveness and learner outcomes. Digital literacy refers to the ability to effectively access, evaluate, utilize, create, and communicate information using digital technologies. Within Mathematics education, digital literacy practices involve the utilization of technological tools, online platforms, multimedia resources, educational applications, and interactive learning environments that facilitate conceptual understanding and learner engagement.

The integration of digital technologies in Mathematics instruction has gained increasing importance due to the growing demand for 21st-century learning competencies. Mathematics teachers are expected to adopt innovative instructional approaches that enhance learner participation, critical thinking, collaboration, and problem-solving skills. Digital tools such as virtual manipulatives, graphing applications, online quizzes, instructional videos, learning management systems, and interactive presentation platforms provide opportunities for more engaging and learner-centered instruction. These technologies support visualization of abstract mathematical concepts, immediate feedback mechanisms, differentiated instruction, and collaborative learning experiences.

The educational disruptions caused by the COVID-19 pandemic further accelerated the integration of digital literacy practices in schools worldwide, including the Philippines. Teachers were compelled to transition from traditional face-to-face instruction to online and blended learning modalities, thereby emphasizing the necessity of digital competence in instructional delivery. Despite the increased use of digital technologies, several schools continue to experience

challenges associated with technological infrastructure, internet accessibility, teacher preparedness, and learner digital competencies. These realities affect the consistent implementation of effective digital literacy practices in Mathematics classrooms.

Existing literature suggests that technology integration positively influences learner motivation, academic engagement, and achievement when effectively implemented. Studies indicate that digital learning environments enhance learner interaction, strengthen conceptual understanding, and encourage active participation in mathematical tasks. Moreover, digital literacy practices support self-directed learning and provide learners with flexible access to instructional resources. However, the effectiveness of technology integration largely depends on teachers' pedagogical competencies, technological readiness, and classroom implementation strategies.

The theoretical foundation of this study is anchored on Lev Vygotsky's Constructivist Theory, which emphasizes that learning occurs through social interaction and mediated experiences. Digital technologies serve as mediational tools that facilitate collaborative learning and active knowledge construction among learners. The study is likewise supported by the Technological Pedagogical Content Knowledge (TPACK) framework developed by Matthew J. Koehler and Punya Mishra, which highlights the integration of technological knowledge, pedagogical knowledge, and content knowledge in effective instructional practice.

Although several studies have examined technology integration in education, limited qualitative inquiries have explored Mathematics teachers' actual digital literacy practices and their perceived influence on the academic performance of Grade 8 learners in public secondary schools. Most existing studies focus on quantitative assessments of technology utilization and learner achievement, while fewer studies investigate teachers' lived instructional experiences and perceptions regarding digital literacy integration in Mathematics education.

Hence, this study was conducted to explore the



digital literacy practices of Mathematics teachers and their perceived influence on the academic performance of Grade 8 learners. Specifically, it examined the digital instructional practices utilized by teachers, the perceived effects of these practices on learner performance, the benefits associated with technology integration, and the challenges encountered in implementing digital literacy practices in Mathematics instruction.

Research Objectives

This study aimed to explore the digital literacy practices of Mathematics teachers and their perceived influence on the academic performance of Grade 8 learners in Cabagan Integrated School.

Specifically, it sought to:

1. examine the digital literacy practices utilized by Mathematics teachers in teaching Grade 8 learners;
2. explore teachers' perceptions regarding the influence of digital literacy practices on learners' academic performance in Mathematics;
3. identify the perceived benefits of integrating digital literacy practices in Mathematics instruction; and
4. determine the challenges encountered by Mathematics teachers in implementing digital literacy practices in the classroom.

Methodology

Research Design

The study employed a qualitative descriptive research design to explore the experiences, instructional practices, and perceptions of Mathematics teachers regarding digital literacy integration and its influence on learner academic performance.

Participants and Locale of the Study

The participants consisted of eight purposively selected Grade 8 Mathematics teachers from Cabagan Integrated School. Participants were selected based on their experience in utilizing digital technologies in

Mathematics instruction.

Data Collection Procedure

Semi-structured interviews were utilized to gather in-depth information regarding teachers' digital literacy practices, instructional experiences, challenges encountered, and perceived effects on learner performance. Interviews were conducted face-to-face and audio-recorded with participant consent.

Data Analysis

Data were analyzed using thematic analysis following the framework of Virginia Braun and Victoria Clarke. The analysis involved data familiarization, coding, theme generation, theme review, and interpretation.

Ethical Considerations

The study observed ethical protocols including informed consent, confidentiality, voluntary participation, and anonymity of participants.

Results and Findings

Theme 1: Integration of Interactive and Multimedia Digital Tools in Mathematics Instruction

Participants consistently revealed that digital literacy practices in Mathematics instruction primarily involved the use of interactive presentations, educational videos, graphing applications, online quizzes, and learning management systems. Teachers explained that these tools helped simplify complex mathematical concepts and improved classroom interaction.

One participant shared:

"Mas madaling maintindihan ng learners ang lesson kapag gumagamit kami ng visual presentations at videos."

Another teacher stated:

"Interactive applications help learners participate actively during problem-solving activities."

Participants emphasized that digital tools enhanced lesson delivery by making abstract mathematical concepts more concrete and visually understandable. Teachers particularly noted that graphing applications, simulations, and multimedia presentations improved learners' comprehension of algebraic and geometric concepts.

The findings indicate that digital literacy practices support learner-centered and interactive



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instructional approaches in Mathematics education. The integration of multimedia resources promotes active engagement and strengthens conceptual understanding among Grade 8 learners. These findings align with the constructivist perspective of Lev Vygotsky, which emphasizes that learning occurs through mediated and interactive experiences. Similarly, the TPACK framework developed by Matthew J. Koehler and Punya Mishra highlights the importance of integrating technological knowledge with pedagogical and content knowledge to improve instructional effectiveness.

Theme 2: Increased Learner Engagement and Classroom Participation

Teachers consistently perceived that digital literacy practices significantly enhanced learner engagement, classroom participation, and motivation in Mathematics classes. Participants observed that learners became more interested and attentive when technology-based activities were incorporated into instruction.

One participant explained:

“Kapag gumagamit kami ng online games at quizzes, mas excited silang mag-participate.”

Another teacher remarked:

“Digital activities encourage even shy learners to answer and interact during class discussions.”

Participants further observed that technology-mediated instruction encouraged collaborative learning, peer interaction, and active classroom participation. Online platforms and collaborative applications allowed learners to communicate, share solutions, and work together during mathematical activities.

The findings suggest that digital literacy practices foster positive learning environments that encourage learner interaction and academic engagement. Interactive digital activities motivate learners to become more involved in classroom discussions and mathematical problem-solving tasks. These findings support studies emphasizing that technology-enhanced instruction promotes active participation and improves learner motivation in Mathematics

education.

Theme 3: Perceived Improvement in Academic Performance and Mathematical Understanding

Participants perceived that digital literacy practices positively influenced learners' academic performance by improving mathematical understanding, retention, and problem-solving abilities. Teachers explained that digital tools provided learners with opportunities for repeated practice, immediate feedback, and self-paced learning.

One participant shared:

“Mas mabilis nilang naiintindihan ang lesson kapag may visual demonstrations at online practice activities.”

Another teacher stated:

“Learners perform better in assessments because they can review lessons using digital materials.”

Teachers noted that learners demonstrated improvements in solving mathematical problems, analyzing equations, and understanding procedural steps when digital resources were integrated into instruction. Participants also observed that online assessments and educational applications enabled learners to monitor their own learning progress.

The findings indicate that digital literacy practices contribute positively to academic performance by strengthening learner comprehension and promoting independent learning behaviors. Technology-assisted instruction supports differentiated learning experiences and facilitates immediate instructional feedback, which are essential in improving learner achievement in Mathematics.

Theme 4: Challenges in Implementing Digital Literacy Practices

Despite the instructional benefits of digital literacy practices, participants identified several challenges affecting effective implementation in Mathematics classrooms. The most commonly cited challenges included unstable internet connectivity, limited technological resources, insufficient learner access to gadgets, and varying levels of digital competence among learners.



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One participant explained:

“Hindi lahat ng learners may gadgets kaya nahihirapan silang sumabay sa digital activities.”

Another teacher stated:

“Minsan hindi natutuloy ang online activities dahil mahina ang internet connection.”

Participants also highlighted difficulties in classroom management during technology-mediated instruction, including learner distractions and technical interruptions. Some teachers expressed concerns regarding limited training opportunities related to advanced digital pedagogical practices.

The findings reveal that technological and institutional barriers continue to affect the effective integration of digital literacy practices in public secondary schools. While teachers recognize the value of digital technologies in Mathematics instruction, inadequate technological infrastructure and resource limitations hinder consistent implementation.

Discussion

The findings of the study demonstrate that Mathematics teachers actively integrate digital literacy practices to improve instructional delivery and learner engagement among Grade 8 learners. Teachers utilized various digital technologies, including interactive presentations, online assessment tools, educational applications, and multimedia resources to facilitate meaningful learning experiences. These practices support learner-centered instruction and strengthen conceptual understanding of mathematical concepts.

The study further revealed that digital literacy practices positively influence learner engagement and classroom participation. Teachers observed that technology-mediated activities increased learners' motivation, confidence, and willingness to participate in classroom discussions and collaborative tasks. The use of interactive digital platforms created engaging learning environments that encouraged active learner involvement and peer interaction.

Participants also perceived that digital literacy practices improved learners' academic performance by enhancing comprehension, retention, and

mathematical problem-solving skills. Digital tools provided opportunities for repeated practice, immediate feedback, and independent learning, which contributed to improved learner outcomes. These findings support existing literature emphasizing the effectiveness of technology integration in improving academic achievement and learner engagement in Mathematics education.

However, the study likewise revealed persistent challenges affecting the implementation of digital literacy practices. Technological limitations such as poor internet connectivity, lack of gadgets, insufficient digital infrastructure, and limited teacher training hindered effective classroom integration. These findings indicate the need for institutional support, technological investments, and sustained professional development programs to strengthen digital pedagogical practices among Mathematics teachers.

Overall, the findings suggest that digital literacy practices play a significant role in improving Mathematics instruction and learner academic performance when effectively implemented and supported by adequate technological resources and teacher competencies.

Conclusion

The study explored the digital literacy practices of Mathematics teachers and their perceived influence on the academic performance of Grade 8 learners. Findings revealed that teachers integrate various digital technologies such as multimedia presentations, online assessment tools, educational applications, and interactive learning platforms to enhance Mathematics instruction.

Teachers perceived that digital literacy practices positively influenced learners' academic engagement, participation, conceptual understanding, and problem-solving abilities. The integration of technology created more interactive and learner-centered instructional experiences that improved learner motivation and classroom participation.

Despite these positive outcomes, teachers encountered several challenges including unstable



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internet connectivity, limited technological resources, insufficient learner access to gadgets, and varying levels of digital competencies among learners. These barriers affected the consistent implementation of technology-mediated instruction in Mathematics classrooms.

The study concludes that digital literacy practices significantly contribute to improving Mathematics instruction and learner academic performance when supported by appropriate technological infrastructure, institutional support, and teacher preparedness.

Implications of the Study

The findings of the study provide important implications for educational institutions, school administrators, curriculum developers, and policymakers. Schools may strengthen technological infrastructure by improving internet connectivity, providing adequate digital devices, and ensuring access to educational technologies that support Mathematics instruction.

The study likewise highlights the need for continuous professional development programs focusing on digital pedagogy, instructional technology integration, and innovative Mathematics teaching strategies. Teacher training initiatives may help educators improve their digital competencies and effectively utilize technology-mediated instructional approaches.

Curriculum planners may also integrate technology-enhanced learning activities and digital literacy competencies within Mathematics curricula to promote learner engagement and academic achievement. Furthermore, schools may establish support systems that assist learners who experience limited access to digital resources and technological tools.

Future researchers may conduct similar studies involving larger participant groups, mixed-methods approaches, or comparative analyses across different educational settings to further examine the relationship between digital literacy practices and learner academic performance.

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