A review of practices and digital technology integration in reading instruction and suggestions for the Philippines

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ABSTRACT

Reading literacy has been a challenge in the Philippines based on recent large-scale literacy assessment in two consecutive years. This may be a result of a mismatch between reading instruction and the interest and motivation of students as 21st century learners in improving their reading skills. However, it is early to instigate such assumption. Hence, this systematic review examines eight articles related to reading instruction research in the Philippines and seven articles on digital technology integration for reading instruction. The paper finds no research on digital technology integration for reading instruction in the Philippine context, while studies conducted in other countries show the efficiency of digital technology interventions in reading literacy development. The findings emphasize the necessity for digital technology research in the reading instruction in the country. This report recommends empirical studies, curriculum adjustments, teacher training, and community engagements on technology-enabled reading education. Based on the findings of this study and a review of related literature, the PREACT framework (Policy, Research, Empirical study, Curriculum and resource adaptation, Community engagement and access, Teacher training and development) is proposed as a potential approach to transform reading instruction in the Philippines.

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1. INTRODUCTION

The Philippines faces a significant challenge in reading literacy, having consistently ranked among the lowest performing countries in the Program for International Student Assessment (PISA) [1]–[3]. These large-scale assessments provided valuable data on student achievement, but did not offer a clearer understanding of the specific weaknesses within reading instruction. While the low scores raise concerns, further investigation is needed to realize the exact factors affecting Filipino students' reading skills development. Several studies have explored the various factors contributing to this low reading proficiency in the Philippines [2], [4], [5]. These studies identified challenges faced by students in areas like decoding, fluency, comprehension, and motivation [5]. Additionally, low reading proficiency is suggested to be linked to broader factors such as mastery of foundational reading skills (e.g. lack of vocabulary, phonological problems, and lack of comprehension), the inclusion of at-risk students, teacher competence, availability of reading

materials and facilities, parental involvement, and student support (e.g. socio-emotional, physical, and mental) [6]. These studies offered valuable insights, but they primarily focused on identifying the problems, leaving a gap in our understanding of how to address them effectively.

While these studies offer valuable insights, there is a gap in research on how educational policies and curriculum translate into teachers' reading instruction practices in classrooms. Is there a clear alignment between what is mandated by policies and what teachers are equipped and empowered to implement? Furthermore, how does this combined approach of policy, curriculum, and classroom practice ultimately affect student learning outcomes in reading? A deeper understanding of this connection is crucial for developing more effective reading instruction strategies. Furthermore, integrating digital technologies for language learning, particularly reading, remains an under-researched area, especially in the Philippine context [7], [8]. This is evident in the limited number of high-quality studies specifically focused on the Philippines in the context of reading instruction, student perspectives on developing reading skills, and digital technology integration. A study [9] further emphasized this lack of data from lower-middle-income economies such as the Philippines. Hence, exploring the potential of digital tools to enhance reading instruction and student engagement is crucial, considering the growing ubiquity of technology in classrooms.

In this context, developing the necessary reading skills for learners can be challenging [10]. However, the integration of digital technologies may provide a revolutionary answer to the difficulties encountered by learners in the 21st century by offering creative tools and platforms that improve educational experiences [11]. According to previous study [12], technologies make it easier for students to study in a way that is customized to their individual needs, allowing them to interact with educational material that is adjusted to their own speed, preferences, and methods of learning. In addition, the incorporation of digital technologies such as virtual reality, artificial intelligence, and interactive educational applications promotes immersive and hands-on learning experiences, fostering the development of critical thinking, problem-solving abilities, and digital literacy in students [13], [14]. Digital technologies provide engaging and personalized learning experiences that accommodate various learning styles of learners to overcome difficulties in reading skills in the 21st century [15], [16]. However, existing studies in the Philippines related to this have not fully examined the affordances of such technologies for reading instruction.

Hence, this systematic review article aims at examining related studies in reading instruction and digital technology integration, and providing suggestions that can potentially support reading instruction using digital technologies. To realize these objectives, this paper answers the following questions:
i) What reading instruction studies have been conducted in the Philippines for the past 6 years?
ii) How do digital technologies support reading instruction?
iii) What are some suggestions for more innovative reading instruction using digital technologies?

2. METHOD

This study utilizes the art and science of quality systematic review and the systematic review process to thoroughly evaluate the landscape of reading instruction in the Philippines and their impact on students' reading comprehension [16], [17]. Additionally, it investigates the potentials of digital technology integration in enhancing the development of reading skills among learners. This review employs comprehensive search from research databases (Scopus and ERIC) for relevant reading instruction studies. It applies specific filters and inclusion criteria to select research that focuses on reading instruction methodologies, their effects on the reading comprehension of Filipino students, and the role of digital technology in this context. This review uses systematic screening procedures and organized data extraction to analyze chosen research. It assesses the quality of these studies and synthesize their findings to discover patterns, trends, and differences in methods of instruction and technology interventions. Furthermore, the final list of titles and abstract of the studies were categorized based on their research themes. This is to develop connection to the research trends that revolve around the topics of this paper. Hence, this review seeks to provide practical insights for educators, policymakers, and researchers who wish to develop reading instruction practices and effectively utilize digital tools to enhance reading comprehension among Filipino students. Through this approach, addressing biases, discussing limitations, and offering implications and recommendations are accomplished [16], [17].

2.1. Data sources

Data obtained for this paper come from two bibliographic databases. First, this paper sought articles on Scopus using advanced query by searching "reading instruction in the Philippines" (reading AND instruction AND in AND the AND Philippines) and digital technology integration for reading instruction (digital AND technology AND integration AND for AND reading AND instruction). The two main keywords represented the foci of this paper, being solely centered on reading instruction in the Philippine context and the potentials of digital technology integration for reading instruction. Consequently, Scopus offers an extensive

multidisciplinary literature that indexes 40,562 peer-review journals [18]. Furthermore, the Scopus API was accessed using the researcher's email provided by the institution, Kyung Hee University. Second, the same keywords were applied in ERIC to explore more related articles published related to the theme. ERIC, at the same time, collects and critically analyzes multiple research studies. Thus, using these databases provided extensive coverage of literature and academic papers focused on education-specific research, ensuring a comprehensive systematic review [19], [20].

2.2. Inclusion and exclusion

This section explains the inclusion and exclusion criteria considered in this paper. It should be noted that although the same keywords were used for the search of papers, there are some differences in terms of the advanced search features utilized separately from the research databases. Particularly, Scopus database uses advanced search tools that refine studies specific to the need of researchers. In this review, the researcher utilized the filters as shown in Table 1. Hence, making them part of the inclusion criteria.

Table 1. Filters and inclusion criteria utilized to select relevant papers from Scopus

Filters	Inclusion
Year	2018 to 2023
Subject area	Social sciences, arts and humanities
Document type	Article
Country territory	Philippines
Language	English

*Country is disregarded for the keyword 2
(digital technology integration for reading instruction)

In adherence to the outlined criteria as in Table 1, papers that failed to align with the defined inclusion criteria were excluded from this comprehensive review. The selection process strictly followed the set specifications, ensuring that only items that fit the defined criteria were included. The purpose of this careful method ensured the quality and relevance of the chosen literature, promoting a systematic and focused examination within the scope of this review. Moreover, Table 2 indicates the specific filters and inclusion criteria set for relevant paper search on the ERIC database.

Table 2. Filters and inclusion criteria utilized to select relevant papers from ERIC

Filters	Inclusion
Year	2018 to 2023
Subject area	Language instruction, second language instruction, teaching methods
Document type	Journal article
Country territory	Philippines
Language	English

*Country is disregarded for the keyword 2 (digital technology integration for reading instruction)

The same criteria were applied to the ERIC database. However, it should be noted that the descriptors language instruction, second language instruction, and teaching methods were applied. At the same time, keyword search for "digital technology integration for reading instruction" was not limited to studies conducted in the Philippines. Furthermore, this study adhered to specific exclusion criteria conducted from the two research databases. First, for the keyword search (reading instruction in the Philippines), excluded were papers that did not involve participants or context from the Philippines. However, this criterion was not followed for the second keyword search (digital technology integration for reading instruction). Thus, published papers conducted in other countries were considered to address the lack of studies published in the Philippine context. Second, published articles that focus involved other language skills and themes (e.g. writing, speaking, listening, mother tongue-based multilingual education) other than reading were also excluded. Lastly, papers that are not in English were not included in this review.

3. RESULTS AND DISCUSSION

This section reveals the results in relation to the questions of this paper. The first two parts illustrate the articles investigated for this study. The succeeding two parts further discuss the findings and implications from the papers obtained from the article search in relation to the foci of this study. The last part demonstrates the proposed framework for the potential integration of digital technologies in reading instruction.

3.1. Articles on "reading instruction in the Philippines"

Table 3 reveals the reading instruction research in the Philippines from 2018 to 2023. The following list of articles were obtained after thoroughly checking the relevant titles and abstracts that adhered to the inclusion criteria set for the study. In total, eight papers were obtained, three from Scopus database and five from ERIC.

Table 3. Studies obtained based on the keyword search "reading instruction in the Philippines"

Title	Authors (Year)	Research theme
Assessment of the reading curriculum in basic education in the Philippines context	Abejuela *et al.* (2023)	Curriculum assessment
Printing out loud: perceptions of teachers on print form of modular instruction amid COVID-19 crisis	Cahapay *et al.* (2023)	Perception study
Enhancing students' concept understanding through collaborative-metacognitive use of science literature	Daloos *et al.* (2023)	Experimental study
Strategic reading intervention for left-behind learners in the Philippines	Pocaan *et al.* (2022)	Experimental study
Using machine learning approaches to explore non-cognitive variables influencing reading proficiency in English among Filipino learners	Bernardo *et al.* (2021)	Predictive modeling and analysis
Chavacano as a medium of instruction: Its implications for the reading levels of English in elementary school pupils	Saavedra (2020)	Observational study
A literature review on remedial reading teachers: the gaps in the Philippine context	Gatcho and Bautista (2019)	Systematic review
Vocabulary size, reading motivation, reading attitudes and reading comprehension performance among Filipino college learners of English	Gunobgunob-Mirasol (2019)	Correlational analysis

Table 3 showed that three papers (37.5%) were published in 2023, 12.5% in 2022, 12.5% in 2021, 12.5% in 2020, and 25% in 2019, while no papers published in 2018. This trend could mean that there is a fair academic interest in or research being done on reading instruction in the Philippines. Notably, the findings revealed more interest in the reading instruction theme in 2023. For instance, the study [21] departed from the growing concern of the reading literacy in the country and focused on investigating the reading competencies, approaches to reading instruction and assessment before and during the COVID-19. Additionally, the titles and abstracts were comprehensively categorized based on the research themes (n=7) of the studies retrieved from the databases. These themes are experimental studies (28.57%) [22], [23], curriculum assessment (14.30%) [21] perception study (14.30%) [24], predictive modeling and analysis (14.30%) [25], observational study (14.30%) [26], systematic review (14.30%) [27], and correlational study (14.30%) [28]. These findings, however, insightful in proving a glimpse of reading instruction research in the Philippines, underscore the scant literature in digital technologies for reading instruction in the country.

3.2. Articles on "digital technology integration for reading instruction"

The findings from the databases search under the set inclusion and exclusion criteria revealed no article published in the Philippines context for the keyword "digital technology integration for reading instruction." Hence, the search was not limited to the Philippines alone. Table 4 summarizes the published articles from different years (2018, 2022, and 2023).

Table 4. Studies obtained based on the keyword "digital technology integration for reading instruction"

Title	Author (Year)	Research theme	Country
The effectiveness of Tier 1 digital interventions for early reading: A meta-analysis	Vanbecelaere (2023)	Meta-analysis	Belgium
The use of web 3.0 tools for reading skill development: case blogs in virtual education	Chimbo-Caceres (2022)	Experimental	Ecuador
Application of blended learning in English fiction literature course	Nurieva (2018)	Experimental	Russia
The DigiLit Framework	Baxa and Christ (2018)	Pedagogy	N/A
Video self-modeling as a reading fluency intervention for dual language learners with disabilities	Edwards and Lambros (2018)	Experimental	USA
Enhancing children's literacy skills: designing the Q-Tales ecosystem for children's e-book design and publication	Long *et al.* (2018)	Pedagogy	N/A
The impact of social strategies through smartphones on the Saudi learners' socio-cultural autonomy in EFL reading context	Alzubi *et al.* (2018)	Experimental	Saudi Arabia

The articles in Table 4 covered only three research themes such as meta-analysis, experimental, and pedagogy. The dataset consisted of seven publications, with a breakdown of three articles (42.9%) published

in 2018, one article (14.3%) in 2022, and three articles (42.9%) in 2023. The articles originated from several nations, including Belgium which provided one meta-analysis article [29], Ecuador [30], Russia [31], Saudi Arabi [32], and USA [33], which contributed to experimental study research theme. Additionally, two papers contributed to pedagogy [34], [35]. However, the location or country is not mentioned from the database. This range of study topics and global representation indicate a worldwide interest in investigating interventions to improve reading skills, leveraging technology, and addressing different teaching methods in various educational settings. However, the results revealed a notably lacking substantial number of papers investigating the role of digital technology in reading instruction, reflecting a potential gap in exploring this crucial aspect of educational advancement in the Philippine context.

3.3. Reading instruction research in the Philippines

The collection of articles published from 2018 to 2023, focusing on reading instruction in the Philippines, presented a fair range of study topics and contributions [21]–[28]. Significantly, these publications covered a wide range of study approaches. The identified papers primarily consisted of experimental studies. These studies focused on strategic reading interventions for left-behind learners [23], the use of collaborative-metacognitive strategies to enhance students' concept understanding through science literature [22], and teachers' perceptions of the print form of modular instruction during the COVID-19 crisis [24]. Moreover, advanced analytical tools were employed to investigate non-cognitive factors that impact reading competency in Filipino students, emphasizing the use of predictive modelling and analysis methods to comprehend reading skills [25]. Furthermore, the evaluation of the reading curriculum in primary education, observations on the utilization of Chavacano as a medium of instruction and its implication on reading levels of English among elementary students, a thorough examination of remedial reading instructors, and a correlation analysis on vocabulary breadth and reading proficiency among Filipino college students greatly aided in understanding the complexities of reading instruction within the Philippine setting [21], [26], [28]. The wide range of study topics and approaches in this field provided insights into different aspects of teaching reading, specifically tailored to the specific aspects and requirements of the education system in the Philippines. These inquiries, which encompassed experimental studies, curriculum evaluation, and predictive modelling, provided significant observations and potential strategies to improve reading literacy among students in the country.

Nevertheless, despite the studies informing about effective teaching methods, opportunities for tailored interventions, and even challenges in reading instruction, there is a discernible deficiency of specific studies that concentrate on the explicit utilization of digital technology to improve reading abilities. The scarcity of research focused on digital interventions or technology-enabled learning tools during this period indicates a promising field for further investigation. If properly incorporated, digital technology has the capacity to transform reading education by providing customized learning experiences, interactive platforms, and access to a wide range of resources that adapt to individual learning preferences [36]. Utilizing digital resources, such as interactive e-books, instructional apps, and adaptive learning platforms, can enhance student engagement, motivation, and understanding, thereby improving reading skills [37]–[39] Thus, the lack of extensive research in digital technology integration for reading instruction emphasizes a promising opportunity for future studies focused on utilizing the revolutionary capabilities of digital technologies to enhance reading teaching and improve literacy results in the educational setting of the country.

3.4. Digital technology integration in reading instruction

In the review study, the papers obtained from the research databases emphasized the varied uses of digital technologies in aiding reading instruction in various countries. The meta-analysis conducted by Vanbecelaere et al. [29] examined the efficacy of Tier 1 digital interventions for early reading. It offered a thorough summary of the influence of digital tools on the development of early literacy. Similarly, Antón-Sancho and Sánchez-Calvo [30] investigated the use of online 3.0 resources, particularly case blogs in virtual education, to improve reading skills. Their study showcased the capacity of cutting-edge online technologies to facilitate learning experiences. The study conducted by Nurieva et al. [31] highlighted the use of blended learning in an English fiction literature course. This approach incorporated digital resources alongside traditional teaching methods to improve student engagement and comprehension. Moreover, scholarly publications, such as "The DigiLit Framework" [34] and "Enhancing children's literacy skills" [35] investigated instructional frameworks and learning material designs for publishing children's e-books. These studies reported the significance of organized digital interventions in fostering the development of literacy skills. In addition, Long et al. [35] explored the effects of social tactics facilitated by smartphones on the socio-cultural autonomy of learners in an EFL reading setting. They emphasized the role of mobile technology in language acquisition. These studies collectively demonstrated the various ways in which digital technology can potentially improve reading instruction by promoting engagement, accessibility, and innovative learning experiences in different contexts and locations.

While the stated studies offered valuable insights into the use of digital technology in reading instruction in different nations, there is a notable gap in this specific context in the Philippines. In fact, when compared to the PISA reading literacy results of the nations mentioned in the list in Table 4, the Philippines is situated at the bottom. The Philippines scored a mean of 340 in 2018, below the world average and behind the USA (M=505), Belgium (M=493), Russia (M=479), and Saudi Arabia (M=399). Belgium (M=479) and USA (M=504) stayed constant by 2022, while Saudi Arabia (M=383) scored lower than the previous assessment year but the Philippines (M=347) slightly improved. These rankings showed that while the Philippines improved its reading literacy scores between 2018 and 2022, it still lagged behind the aforementioned countries, indicating the need for continued efforts to improve reading literacy in the country [3], [40].

With the wide range of technology available and the growing availability of digital resources in the Philippines [41]–[43], there is a chance to conduct targeted research and implement specific interventions that are relevant to the Philippine context. The lack of specialized research focusing on the integration of digital technologies specifically for reading education in the Philippines indicates a promising subject that requires additional investigation. By incorporating digital technologies into reading instruction, considering the specific challenges and needs of the country, children could greatly benefit from increased engagement, improved accessibility, and personalized learning experiences. Hence, further investigation focused on examining the potential of digital technology in the Philippine context can greatly enhance reading instruction and literacy development among learners.

3.5. Suggestions for more innovative reading instruction using digital technologies

The results revealed the lack of studies in reading instruction using digital technologies, especially in the Philippine context. Therefore, based on the findings and the existing literature, this paper posits PREACT framework as seen in Figure 1. The framework promotes the potential of digital technologies for reading instruction, specifically in the Philippine context.
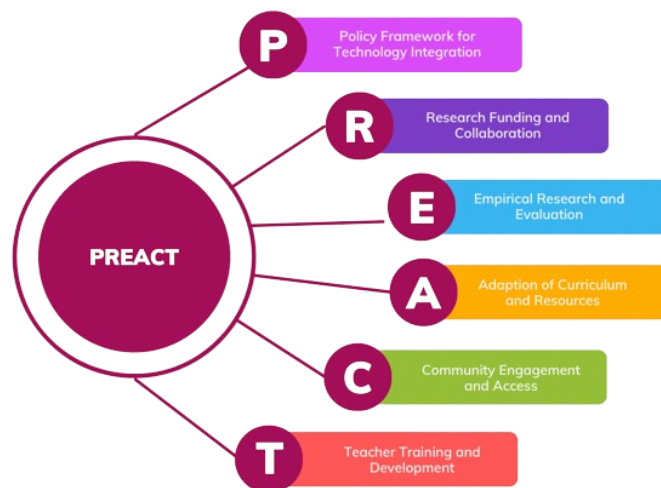

Figure 1. PREACT framework

3.5.1. Policy framework for technology integration

Implementing rules and guidelines to integrate digital technologies into reading instruction in the Philippine educational institutions is crucial for fostering reading literacy among learners [41]. These policies should provide clear directives on how educators can analyze the suitability of digital resources, strategically deploy them within the curriculum, and assess their impact on enhancing student reading skills. By outlining systematic approaches for incorporating technology, educational institutions can ensure that digital tools are utilized in a purposeful manner to support and enhance reading instruction, ultimately contributing to improved literacy outcomes for students [44].

3.5.2. Research funding and collaboration

Collaboration between educational institutions, government agencies, and tech companies is essential to conduct empirical research on digital technology integration for reading instruction in the Philippines [45]. By encouraging cooperation among stakeholders, innovative digital tools and platforms can be developed to

address various educational needs beyond reading instruction, benefiting the country's education system [11]. This collaborative effort can foster an innovative environment for the exchange of expertise and resources, leading to the development of tailored solutions that can effectively enhance teaching and learning practices in the country [46].

3.5.3. Empirical research and evaluation

Encouraging empirical studies to investigate how digital technology integration improves Filipino students' reading performances is paramount [47]. Consequently, these studies can inform educational policies and practices effectively. Additionally, longitudinal research is essential to measure the long-term effects of technology integration on reading proficiency and overall student achievement. Such systematic approaches allow both researchers and educators to assess not only immediate impacts of digital technology integration to reading instruction but also sustain its benefits over time, providing valuable insights into the effectiveness of digital tools in enhancing literacy skills among Filipino students.

3.5.4. Adaption of curriculum and resources

Revisiting the curriculum to incorporate transformative digital technology integration components is imperative for the enhancement of learners' reading skills in the Philippine educational context [48]. For instance, introducing or adapting resources such as interactive e-books, educational apps, and online platforms such as virtual reality, augmented reality, digital games can offer innovative avenues to engage students in reading practices and strengthen their reading proficiency [37]–[39], [49]. These digital resources should be carefully selected or developed to align with curriculum standards and reflect the cultural and linguistic diversity of the Philippine context. By supplementing traditional teaching methods with these tailored digital tools, educators can create dynamic and immersive learning experiences that cater to diverse learning needs and ultimately enhance students' reading abilities.

3.5.5. Community engagement and access

Leveraging community collaborations, internet access, and devices is crucial to ensure that all students have equal access to digital resources for reading instruction [13]. Consequently, students can benefit from an equitable access to technology-assisted reading instruction, which offers numerous advantages. Technology can personalize learning experiences, cater to individual learning styles, and provide interactive and engaging content to enhance comprehension and retention [14].

3.5.6. Teacher training and development

Developing and facilitating comprehensive training programs for educators is essential to support the integration of digital technologies into reading instruction effectively [50]. These programs should provide educators with the necessary knowledge, skills, and strategies to leverage digital tools and resources to enhance learners' reading literacy and learning experience. Educators should invest in continuous training and support to improve their instructional practices, increase student engagement, and ultimately foster a more dynamic and effective learning environment for enhancing reading skills through digital technology integration.

These suggestions may assist policy makers and school stakeholders in ensuring that the use of digital technologies can improve reading instruction, literacy outcomes, and student readiness for a technologically advanced educational landscape. The framework can help narrow the reading literacy gap and enhance education of the country at large. However, it should be noted that the integration of digital technologies into reading instruction may depend on infrastructure, teacher training, resource availability, and technology adaptability to unique educational situations [51]–[53]. The effectiveness and generalizability of these suggestion may vary depending on the unique circumstances and needs of different institutions, classrooms, regions, teachers, or communities.

4.   CONCLUSION

Research on the integration of digital technologies in reading practices in the Philippines between 2018 and 2023 encompassed a variety of methodologies and themes, exploring challenges, methods, and approaches. However, a noticeable gap exists in specialized research on the integration of digital technologies for reading instruction. While studies from Scopus and ERIC databases shed light on global aspects of technology integration in reading instruction, the lack of related studies in the Philippines underscores the necessity for further research in this area. Such approach, if pursued, could potentially offer innovative digital tools to enhance teaching methods and improve reading literacy among Filipino students.

While this review offers comprehensive insights into the landscape of reading instruction and the dearth of specific research on digital technology integration within the Philippine context, it has certain limitations. Firstly, the study's reliance of Scopus and ERIC may have overlooked relevant research not

indexed or available in these databases. Secondly, the focus on English-language publications may have excluded relevant studies in local language, which may have limited its findings. Thirdly, the 2018-2023 timeframe may have missed earlier studies, which can provide additional insights. The lack of studies on digital technology integration in the Philippines warrants cautious interpretation of the findings, as there may be ongoing or unpublished research.

The findings of this study, along with existing literature, illuminate the potential of the proposed PREACT framework to transform reading instruction in the Philippines, particularly through the integration of digital technologies. Thus, for future studies, researchers may address the gap on digital technology integration in reading instruction in the Philippines by observing or considering the proposed framework. This study posits empirical investigation on how digital technologies affect Filipino students' reading instruction and literacy outcomes is suggested. Researchers may also explore the efficiency of digital technologies, their long-term effects, and preparedness and adaptability variables of institutions, school administrators, teachers, and students. In addition, stakeholder collaboration is suggested to create and implement evidence-based interventions for digital technology integration into Philippine reading instruction is essential. Through this, inquiries in this discipline can help educators, policymakers, and stakeholders employ digital technology to improve Filipino students' reading literacy. Finally, it should be noted that digital technology integration into reading instruction may depend on infrastructure, teacher training, resource availability, and adaptability to the Philippine educational environments. This means that these suggestions may work differently in different school contexts and communities across the country.

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