IMJRISE
International Multidisciplinary Journal of
Research for Innovation, Sustainability, and Excellence
Volume 1, Issue no. 2 (2024)

Advancing Literacy and Numeracy: Exploring Trends and Strategies for Elementary School Students

Artemio M. Echavez, Jr.
Teacher I, San Antonio Integrated School, Cebu Province Division, Boljoon, Cebu, Philippines
https://orcid.org/0000-0002-9270-1749 | artemio.echavez@deped.gov.ph

Charish V. Yncierto
Teacher I, San Antonio Integrated School, Cebu Province Division, Boljoon, Cebu, Philippines
https://orcid.org/0009-0003-5791-7012 | charish.yncierto@deped.gov.ph

Rosalina R. Obiasada
Teacher I, San Antonio Integrated School, Cebu Province Division, Boljoon, Cebu, Philippines
https://orcid.org/0009-0002-0350-0601 | rosalinaobiasada2@gmail.com

Maricel C. Dayag
Teacher I, Nug-as Elementary School, Schools Division of Cebu Province, Argao, Cebu, Philippines
https://orcid.org/0009-0000-7783-1468 | maricel.dayag@deped.gov.ph

Rubelyn R. Alcazar
Teacher I, Nug-as Elementary School, Schools Division of Cebu Province, Argao, Cebu, Philippines
https://orcid.org/0009-0008-7183-4957 | rubelyn.requina@deped.gov.ph

Osias Kit T. Kilag
School Principal, PAU Excellencia Global Academy Foundation, Inc., Toledo City, Cebu, Philippines
https://orcid.org/0000-0003-0845-3373 | osiaskit@gmail.com

Abstract:

This systematic literature review examines current trends in literacy and numeracy research among elementary school students. Through a comprehensive analysis of existing literature, key themes emerged, including the integration of technology in instruction, emphasis on inclusive education practices, recognition of interdisciplinary approaches, and persistent disparities in student achievement. The review highlights the growing use of digital tools, multimedia resources, and educational software to enhance student engagement and personalize learning experiences. Additionally, there is an increasing emphasis on accommodating diverse learner populations through strategies such as differentiated instruction, universal design for learning (UDL), and culturally responsive teaching. Furthermore, researchers underscore the importance of integrating literacy and numeracy instruction across content areas, particularly in interdisciplinary contexts like STEM education. Despite advancements, persistent disparities in student achievement remain, particularly among marginalized communities. Addressing these disparities requires targeted interventions, equitable access to resources, and culturally responsive pedagogy. Overall, this review provides valuable insights for educators, policymakers, and community stakeholders seeking to promote inclusive and equitable literacy and numeracy instruction for elementary school students.

Keywords: literacy, numeracy, elementary school students, technology integration, inclusive education

Introduction:

In the realm of education, the development of literacy and numeracy skills among elementary school students stands as a pivotal focus for educators, policymakers, and researchers alike. Proficiency in these foundational domains not only serves as a precursor for academic success but also fosters critical thinking, problem-solving abilities, and overall cognitive development (Abella, et al., 2024). Over the years, numerous studies have delved into understanding the intricacies of literacy and numeracy acquisition, aiming to uncover effective instructional strategies, identify potential challenges, and explore innovative approaches to enhance student learning outcomes.

This systematic literature review embarks on a comprehensive journey to explore the evolving landscape of literacy and numeracy research concerning elementary school students. By synthesizing findings from a diverse array of scholarly works, this study endeavors to shed light on the prevailing trends, emerging themes, and gaps in current knowledge within this domain (Bagacina, et al., 2024). Through an extensive review of empirical studies, theoretical frameworks, and practical interventions, this research aims to provide educators and stakeholders with valuable insights into effective practices and areas warranting further investigation.

Literacy, encompassing reading, writing, and comprehension skills, forms the cornerstone of academic achievement and lifelong learning. As emphasized by Adams (1994), proficient literacy skills are not merely a product of rote memorization but rather a complex interplay of phonological awareness, vocabulary development, fluency, and

comprehension strategies. Similarly, numeracy, defined as the ability to understand and apply mathematical concepts, holds significant implications for students' academic and professional trajectories. According to Ginsburg et al. (2008), a strong foundation in numeracy is indispensable for navigating daily tasks, making informed decisions, and pursuing careers in STEM-related fields.

In recent years, the advent of technology has spurred innovative approaches to literacy and numeracy instruction. With the proliferation of digital tools, multimedia resources, and adaptive learning platforms, educators are presented with new opportunities to engage students and tailor instruction to individualized needs (Coiro & Dobler, 2007; Sarama & Clements, 2009). Moreover, the increasing emphasis on inclusive education has prompted researchers to explore strategies for supporting diverse learners, including those with learning disabilities, English language learners, and students from socioeconomically disadvantaged backgrounds (Gersten et al., 2008; NCTM, 2020).

Despite significant advancements in literacy and numeracy research, several gaps persist, warranting further inquiry. For instance, while much attention has been devoted to early literacy interventions, relatively fewer studies have examined effective strategies for fostering advanced reading comprehension skills or addressing the needs of struggling readers in upper elementary grades (Connor et al., 2009; Shanahan & Shanahan, 2008). Similarly, the intersectionality of literacy and numeracy, particularly in interdisciplinary contexts such as science and social studies, remains underexplored, necessitating a more holistic approach to curriculum design and instructional practices (National Research Council, 2012).

In light of these considerations, this systematic literature review seeks to provide a comprehensive synthesis of existing research on literacy and numeracy for elementary school students. By identifying key trends, challenges, and promising avenues for future investigation, this study aims to inform evidence-based practices and contribute to the ongoing discourse surrounding educational equity and student achievement.

Through a meticulous examination of peer-reviewed journals, conference proceedings, and scholarly publications, this research endeavors to offer valuable insights into the multifaceted nature of literacy and numeracy development, thereby empowering educators and policymakers to make informed decisions and support the diverse needs of elementary school students in their quest for academic excellence and lifelong learning.

Literature Review:

Literacy and numeracy are fundamental skills that serve as the cornerstone of academic achievement and lifelong learning. This literature review aims to provide an in-depth exploration of research trends, theoretical frameworks, empirical findings, and practical implications pertaining to literacy and numeracy development among elementary school students. Through a systematic analysis of existing literature, this review seeks to identify key themes, highlight emerging trends, and pinpoint areas warranting further investigation.

Foundations of Literacy and Numeracy Development

Literacy, encompassing reading, writing, and comprehension skills, plays a pivotal role in students' academic success and socioemotional well-being (Adams, 1994). The acquisition of literacy skills begins early in childhood and evolves through a dynamic process shaped by environmental factors, instructional practices, and individual differences (Snow et al., 1998). According to the National Reading Panel (2000), effective literacy instruction encompasses five essential components: phonemic awareness, phonics, fluency, vocabulary, and comprehension. Mastery of these components is crucial for proficient reading and writing abilities.

Similarly, numeracy, defined as the ability to understand and apply mathematical concepts in various contexts, is a critical competency for navigating daily life and succeeding in academic pursuits (Ginsburg et al., 2008). Numeracy development involves progression through stages of mathematical thinking, from basic counting skills to complex problem-solving strategies (Fuson, 1988). As articulated by the National Council of Teachers of Mathematics (NCTM), numeracy instruction should emphasize conceptual understanding, procedural fluency, strategic competence, and adaptive reasoning (NCTM, 2020).

In recent years, literacy and numeracy research have witnessed several noteworthy trends reflecting advancements in instructional technology, cognitive science, and educational policy. One prominent trend is the integration of digital tools and multimedia resources to enhance literacy and numeracy instruction (Coiro & Dobler, 2007; Sarama & Clements, 2009). Digital platforms offer interactive learning experiences, personalized feedback, and access to vast repositories of educational content, thereby catering to diverse learning styles and preferences.

Moreover, there is a growing emphasis on evidence-based practices and data-driven decision-making in literacy and numeracy instruction (Gersten et al., 2008). Educators are increasingly leveraging assessment data, formative feedback, and progress monitoring tools to identify student needs, tailor instruction, and evaluate the effectiveness of interventions. This focus on accountability and outcomes has spurred research on the efficacy of various instructional approaches, intervention programs, and pedagogical strategies (Cordova Jr, et al., 2024).

Addressing Diverse Learner Needs

Inclusive education, characterized by the provision of equitable opportunities and support for all students, is a central tenet of contemporary literacy and numeracy instruction (Rose & Meyer, 2002). Researchers have explored effective strategies for accommodating diverse learner populations, including students with disabilities, English language learners, and students from culturally and linguistically diverse backgrounds (Connor et al., 2009; Klingner et al., 2006). Differentiated instruction, universal design for learning (UDL), and culturally responsive teaching are among the approaches advocated for fostering inclusive classrooms and promoting equitable access to learning opportunities.

Furthermore, there is a growing recognition of the intersectionality between literacy and numeracy, particularly in interdisciplinary contexts such as science, technology, engineering, and mathematics (STEM) education (National Research Council, 2012). Integrating literacy and numeracy instruction across content areas not only reinforces academic skills but also cultivates critical thinking, problem-solving abilities, and scientific literacy. Interdisciplinary approaches, project-based learning, and real-world applications are gaining traction as effective means of bridging the gap between theory and practice.

Despite significant progress in literacy and numeracy research, several challenges persist, warranting continued attention and innovation. One such challenge is the persistent achievement gap observed among students from marginalized communities, including low-income households, racial and ethnic minorities, and students with disabilities (Reardon, 2011). Addressing disparities in access to high-quality instruction, resources, and support services remains a pressing concern for educators and policymakers.

Additionally, there is a need for more longitudinal studies examining the long-term effects of literacy and numeracy interventions on students' academic trajectories and life outcomes (Allington & McGill-Franzen, 2014). Longitudinal research designs can provide valuable insights into the sustained impact of early interventions, the trajectories of skill development over time, and the factors influencing academic persistence and success.

Furthermore, with the advent of digital literacy and the proliferation of online information, there is a growing need to cultivate critical literacy skills and digital citizenship among elementary school students (Livingstone & Helsper, 2007). Educators must equip students with the ability to critically evaluate sources, discern fact from fiction, and navigate digital environments responsibly and ethically.

Literacy and numeracy development among elementary school students constitute a multifaceted and dynamic domain of research and practice. This literature review has provided an overview of foundational principles, current trends, and emerging challenges in the field of literacy and numeracy education (Manire, et al., 2023). Moving forward, it is imperative for researchers, educators, and policymakers to collaborate in addressing persistent disparities, leveraging innovative approaches, and fostering inclusive learning environments that empower all students to thrive academically and beyond.

Methodology:

A systematic search strategy was developed to identify relevant literature across multiple electronic databases, including academic journals, conference proceedings, and scholarly repositories. Keywords and search terms were carefully selected to ensure inclusivity and comprehensiveness.

Inclusion and exclusion criteria were established to guide the selection of studies for inclusion in the review. Studies were included if they focused on literacy and numeracy development among elementary school students, were published in peer-reviewed journals, and provided empirical evidence or theoretical insights. Non-English studies and those outside the scope of elementary education were excluded. The screening process involved multiple stages to identify relevant studies based on predefined criteria. Initially, titles and abstracts were screened to assess relevance. Subsequently, full-text articles were reviewed to determine eligibility for inclusion in the review. Screening was conducted independently by two researchers, with discrepancies resolved through discussion and consensus.

Data extraction involved systematically extracting relevant information from selected studies, including author(s), publication year, research design, sample characteristics, key findings, and theoretical frameworks. Data were synthesized using thematic analysis to identify common themes, emerging trends, and gaps in the literature. Quality assessment was conducted to evaluate the methodological rigor and validity of included studies. Quality appraisal tools were employed to assess study design, sample representativeness, data collection methods, and potential biases. Studies were rated based on predefined criteria, with higher-quality studies given greater weight in the synthesis process. Data analysis involved synthesizing findings from selected studies to answer the research questions and achieve the study objectives. Synthesized findings were organized thematically and interpreted in light of existing theoretical frameworks and empirical evidence. Patterns, trends, and discrepancies across studies were identified and discussed.

Findings and Discussion:

Integration of Technology in Instruction:
The integration of technology into literacy and numeracy instruction has emerged as a prominent trend, as evidenced by a growing body of research. Scholars have increasingly recognized the potential of digital tools, multimedia resources, and educational software to enhance student engagement and facilitate personalized learning experiences (Coiro & Dobler, 2007; Sarama & Clements, 2009). These technological resources offer interactive features, adaptive feedback mechanisms, and dynamic content delivery methods that cater to diverse learning styles and preferences (Coiro & Dobler, 2007). Moreover, the use of technology in instruction has been associated with improvements in student motivation, academic achievement, and 21st-century skill development (Sarama & Clements, 2009).

Incorporating technology into literacy and numeracy instruction enables educators to create interactive learning environments where students can actively participate in their own learning process (Coiro & Dobler, 2007). For example, digital literacy programs often incorporate gamification elements, such as rewards, badges, and leaderboards, to incentivize student engagement and promote a sense of accomplishment (Sarama & Clements, 2009). Additionally, multimedia resources, such as videos, animations, and simulations, provide visual and auditory cues that enhance comprehension and retention of key concepts (Coiro & Dobler, 2007).

Furthermore, technology-enabled instruction facilitates differentiated learning experiences, allowing educators to tailor instruction to individual student needs (Sarama & Clements, 2009). Adaptive learning platforms use algorithms to analyze student performance data and deliver personalized recommendations for instruction and practice (Coiro & Dobler, 2007). This targeted approach ensures that each student receives the support and scaffolding necessary to achieve mastery of literacy and numeracy skills (Sarama & Clements, 2009).

The integration of technology in literacy and numeracy instruction represents a promising avenue for enhancing student learning outcomes and promoting 21st-century skills. By leveraging digital tools, multimedia resources, and educational software, educators can create engaging and personalized learning experiences that cater to diverse learner needs (Coiro & Dobler, 2007; Sarama & Clements, 2009). Moreover, technology-enabled instruction has the potential to empower students to become active participants in their own learning journey, fostering a lifelong love of learning and inquiry (Coiro & Dobler, 2007).

Inclusive Education Practices:
The literature underscores a noticeable shift towards inclusive education practices, reflecting a growing recognition of the importance of accommodating diverse learner populations (Connor et al., 2009; Klingner et al., 2006). This trend emphasizes the implementation of strategies such as differentiated instruction, universal design for learning (UDL), and culturally responsive teaching to support students with varying needs, including those with disabilities, English language learners, and students from marginalized backgrounds.

Differentiated instruction involves tailoring teaching methods, content, and assessment strategies to meet the individual needs and learning styles of students (Connor et al., 2009). By providing multiple pathways for learning and varying levels of challenge, educators can ensure that all students have the opportunity to succeed academically (Valle, et al., 2023).

Universal design for learning (UDL) takes a proactive approach to inclusivity by designing instructional materials and learning environments that are accessible to all students, regardless of their abilities or backgrounds (Klingner et al., 2006). UDL principles promote flexibility, engagement, and comprehension, allowing educators to address diverse learning needs without the need for extensive modifications or accommodations (Klingner et al., 2006).

Culturally responsive teaching recognizes the importance of acknowledging and valuing students' cultural backgrounds, experiences, and identities in the learning process (Connor et al., 2009). By incorporating culturally relevant content, perspectives, and teaching practices into the curriculum, educators can create a supportive and affirming learning environment that promotes academic success and cultural competence (Connor et al., 2009).

The emphasis on inclusive education practices highlights the importance of fostering learning environments that embrace diversity and support the unique needs of all students (Connor et al., 2009; Klingner et al., 2006). By implementing strategies such as differentiated instruction, universal design for learning, and culturally responsive teaching, educators can create inclusive classrooms where every student feels valued, supported, and empowered to succeed academically and beyond (Olis III, et al., 2023).

Interdisciplinary Approaches to Literacy and Numeracy:
The review highlights a growing recognition of the intersectionality between literacy and numeracy, especially within interdisciplinary contexts like STEM education (National Research Council, 2012). Researchers have underscored the significance of integrating literacy and numeracy instruction across various content areas to

strengthen academic skills and cultivate critical thinking abilities (National Research Council, 2012). This integrated approach not only enhances students' comprehension and problem-solving skills but also fosters a deeper understanding of complex concepts by applying them in real-world contexts (National Research Council, 2012).

Interdisciplinary approaches to literacy and numeracy instruction involve collaborative efforts among educators from different disciplines to design learning experiences that integrate content from multiple subject areas (National Research Council, 2012). Project-based learning, for example, immerses students in hands-on, inquiry-based projects that require them to apply literacy and numeracy skills to solve authentic problems (National Research Council, 2012). By engaging in real-world applications, students develop a deeper appreciation for the relevance and utility of academic concepts, thereby enhancing their motivation and engagement (Rabillas, et al., 2023).

Moreover, interdisciplinary instruction promotes holistic student development by fostering connections between academic disciplines and encouraging interdisciplinary thinking (National Research Council, 2012). Through cross-curricular projects and activities, students learn to draw upon insights from multiple disciplines to analyze complex issues, make informed decisions, and communicate effectively (National Research Council, 2012). This interdisciplinary approach prepares students for the demands of the 21st-century workforce, where interdisciplinary collaboration and problem-solving skills are highly valued (Tañiza, et al., 2023).

Interdisciplinary approaches to literacy and numeracy instruction offer promising opportunities to enhance student learning outcomes and foster holistic development (National Research Council, 2012). By integrating literacy and numeracy instruction across content areas, educators can cultivate critical thinking skills, promote real-world applications, and prepare students for success in an increasingly complex and interconnected world (National Research Council, 2012).

Persistent Disparities in Student Achievement:
The review underscores a sobering reality: despite strides in literacy and numeracy research, significant disparities persist in student achievement, particularly among marginalized communities (Reardon, 2011). Students from low-income households, racial and ethnic minorities, and those with disabilities face disproportionate challenges in academic attainment (Reardon, 2011). These disparities highlight systemic inequities in education that necessitate targeted interventions and a commitment to fostering inclusive learning environments (Reardon, 2011).

Addressing these disparities requires a multifaceted approach that encompasses equitable access to resources, culturally responsive pedagogy, and community collaboration (Gersten et al., 2001). Schools must strive to provide all students with access to high-quality instruction, supportive learning environments, and enriching educational opportunities (Gersten et al., 2001). This may involve allocating resources to underserved schools, implementing evidence-based interventions, and promoting inclusive practices that celebrate diversity and promote academic success (Ondog, et al., 2023).

Moreover, educators must adopt culturally responsive pedagogy that recognizes and respects students' cultural backgrounds, experiences, and identities (Connor et al., 2009). Culturally relevant curriculum materials, instructional strategies, and assessment practices can help create a supportive and affirming learning environment where all students feel valued and empowered to succeed (Connor et al., 2009).

Addressing persistent disparities in student achievement requires a concerted effort from educators, policymakers, and community stakeholders (Reardon, 2011). By implementing targeted interventions, promoting equitable access to resources, and embracing culturally responsive pedagogy, we can work towards creating a more inclusive and equitable education system where all students have the opportunity to thrive academically and beyond (Reardon, 2011).

Conclusion:

The systematic literature review conducted on literacy and numeracy trends among elementary school students has provided valuable insights into the current state of research, identified key themes, and highlighted areas for further exploration. The findings of the review underscore the multifaceted nature of literacy and numeracy development, emphasizing the importance of adopting evidence-based practices, promoting inclusive education, and addressing systemic inequities in education.

The integration of technology in instruction has emerged as a promising avenue for enhancing student engagement and promoting personalized learning experiences. Digital tools, multimedia resources, and educational software offer opportunities to support diverse learning needs and cultivate 21st-century skills among elementary school students.

Moreover, the emphasis on inclusive education practices underscores the importance of accommodating diverse learner populations and fostering inclusive learning environments. Strategies such as differentiated instruction,

universal design for learning (UDL), and culturally responsive teaching can help create supportive classrooms where all students feel valued and empowered to succeed.

Additionally, the recognition of the intersectionality between literacy and numeracy highlights the importance of interdisciplinary approaches to instruction. By integrating literacy and numeracy across content areas and promoting real-world applications, educators can enhance student learning outcomes and foster holistic development.

However, the review also revealed persistent disparities in student achievement, particularly among marginalized communities. Addressing these disparities requires targeted interventions, equitable access to resources, and culturally responsive pedagogy. By working collaboratively to address systemic inequities in education, we can create a more inclusive and equitable learning environment where all students have the opportunity to succeed academically and beyond.

Moving forward, it is imperative for educators, policymakers, and community stakeholders to prioritize evidence-based practices, promote diversity and inclusion, and advocate for equity in education. By continuing to build on the findings of this study and engaging in ongoing dialogue and collaboration, we can work towards a future where every elementary school student has the support and resources they need to thrive academically and reach their full potential.

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