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Development Needs Analysis of Child Literacy Based on Multimodal Technology

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The author(s) declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

ABSTRACT

Purpose: This study aims to analyze the current condition of children's literacy and identify the needs for developing multimodal technology-based literacy in North Konawe Regency, Indonesia.

Research Design and Methodology: A descriptive qualitative approach was employed involving elementary school students, teachers, and school stakeholders. Data were collected through questionnaires, semi-structured interviews, observations, and document analysis, and were analyzed using descriptive analysis, thematic analysis, and SWOT analysis to identify strategic priorities for literacy development.

Findings and Discussion: The findings indicate that although students generally demonstrate positive reading interest, literacy development is constrained by limited reading resources, inadequate technological infrastructure, uneven internet access, insufficient teacher competence in digital pedagogy, and limited locally relevant digital learning materials. The SWOT analysis reveals considerable opportunities for strengthening literacy through multimodal technology, particularly by improving infrastructure, teacher capacity, curriculum integration, and collaboration among educational stakeholders.

Implications: The findings provide evidence-based recommendations for policymakers, schools, and educators to design sustainable multimodal literacy programs that enhance children's literacy competencies while supporting digital transformation in primary education. Future studies are encouraged to evaluate the effectiveness of multimodal literacy interventions across broader educational contexts.

Introduction

Literacy is recognized as one of the essential competencies required for children to participate effectively in the twenty-first century. Beyond the conventional ability to read and write, literacy encompasses the capacity to access, interpret, evaluate, and communicate information through diverse forms of media. The rapid development of digital technology has transformed literacy practices from text-based activities into multimodal experiences that combine written language, images, audio, video, animation, and interactive digital platforms. Consequently, literacy development should no longer rely solely on printed materials but should integrate technology to create more meaningful and engaging learning experiences.

Multimodal technology provides opportunities to improve children's literacy by presenting learning materials through various modes of representation. The integration of text, visual illustrations, audio

narration, videos, and interactive activities enables children to understand information more comprehensively while increasing motivation and learning engagement. Previous studies have reported that multimodal learning environments support reading comprehension, critical thinking, creativity, and problem-solving skills because learners actively construct meaning from multiple sources of information rather than relying on text alone.

Despite these advantages, the implementation of multimodal technology for literacy development remains uneven, particularly in rural and developing regions. Several obstacles continue to hinder its utilization, including limited technological infrastructure, unstable internet connectivity, insufficient digital learning resources, and inadequate digital competencies among teachers and parents. These conditions reduce opportunities for children to experience technology-supported literacy learning that is relevant to current educational demands.

The situation in North Konawe Regency reflects these challenges. Preliminary observations conducted in several elementary schools indicate that students generally demonstrate positive interest in reading; however, this interest has not yet developed into consistent reading habits. Access to quality reading materials remains limited, school literacy facilities are insufficient, and many families are unable to provide adequate reading resources at home. Furthermore, the availability of digital devices and multimodal learning media is still limited, reducing opportunities for children to engage in interactive literacy activities.

Several previous studies have investigated literacy development from different perspectives. Setiawan (2020) developed scientific literacy worksheets for distance learning and found that students' scientific literacy skills had not yet been optimally developed. Setiawan (2019) proposed a thematic learning model oriented toward scientific literacy to improve students' learning experiences. Ardipal et al. (2020) developed music literacy teaching materials and demonstrated their feasibility for classroom implementation. Kurnia et al. (2021) integrated literacy into Civic Education learning and reported improvements in students' independence, creativity, and learning effectiveness. Other studies have also explored Discovery Learning, digital literacy, and social media platforms such as TikTok as alternative media for literacy learning.

Although these studies contribute to literacy development, they primarily emphasize instructional models or specific learning media. Limited research has comprehensively examined the needs for developing children's literacy based on multimodal technology by considering literacy conditions, technological infrastructure, learning resources, teachers' readiness, parental support, and local educational contexts simultaneously. This limitation indicates an important research gap that requires further investigation, particularly in regions where educational resources remain unevenly distributed.

The novelty of this study lies in its comprehensive needs analysis of multimodal technology-based literacy development in North Konawe Regency. Unlike previous studies that mainly evaluated literacy interventions, this research integrates children's literacy conditions, infrastructure readiness, technology utilization, teacher and parent readiness, and learning resource availability into a single analytical framework. The findings are expected to provide evidence-based recommendations for designing sustainable literacy policies and multimodal learning programs suitable for local educational contexts.

Therefore, this study aims to (1) identify the current condition of children's literacy in North Konawe Regency, including reading interest, reading habits, access to reading materials, and support from schools and families; (2) analyze the needs for developing children's literacy based on multimodal technology; and (3) formulate recommendations for implementing multimodal technology to improve children's literacy in North Konawe Regency.

Research Design and Methodology

This study employed a descriptive qualitative research design to examine the current condition of children's literacy and identify the needs for developing multimodal technology-based literacy in North Konawe Regency, Southeast Sulawesi, Indonesia. A qualitative approach was selected because it enables an in-depth understanding of participants' experiences, perceptions, and contextual factors influencing literacy development, while descriptive quantitative data obtained from questionnaires were used to strengthen the interpretation of the findings.

The research was conducted in three elementary schools representing different educational settings in North Konawe Regency. The participants consisted of elementary school students, teachers, and school stakeholders who were purposively selected based on their involvement in literacy activities and technology-supported learning. This sampling strategy allowed the researchers to obtain comprehensive information regarding literacy practices, technology utilization, and educational needs from multiple perspectives.

Data were collected through questionnaires, semi-structured interviews, observations, and document analysis. The questionnaire was designed to obtain quantitative descriptions of students' reading interest, reading habits, access to reading materials, environmental support, challenges in literacy activities, availability of technological infrastructure, teacher readiness, curriculum implementation, and the use of multimodal technology in literacy learning. Semi-structured interviews were conducted with teachers and school representatives to explore their experiences, perceptions, and expectations regarding the implementation of multimodal technology for literacy development. Classroom observations were carried out to examine literacy activities, learning environments, technological facilities, and students' engagement during learning processes. Supporting documents, including school literacy programs, curriculum documents, and institutional policies, were also reviewed to complement the primary data.

The research instruments were developed based on indicators of children's literacy and multimodal learning identified in previous studies and relevant educational policies. Prior to implementation, the instruments were reviewed to ensure their relevance to the research objectives and local educational context.

Data analysis followed an interactive model consisting of data reduction, data display, and conclusion drawing. Questionnaire data were analyzed descriptively using percentages to present the distribution of participants' responses. Qualitative data obtained from interviews, observations, and document analysis were coded, categorized, and interpreted to identify recurring themes related to literacy conditions, technological readiness, opportunities, challenges, and development needs. Data triangulation across multiple sources and collection techniques was employed to enhance the credibility and trustworthiness of the findings.

To formulate strategic recommendations, the study further employed a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis. Internal factors, including technological infrastructure, teacher competencies, literacy practices, and learning resources, were analyzed alongside external factors such as educational policies, technological development, community participation, and socio-economic conditions. The SWOT analysis provided a comprehensive framework for identifying strategic priorities and proposing sustainable recommendations for the implementation of multimodal technology-based literacy development in North Konawe Regency.

The combination of qualitative inquiry, descriptive statistical analysis, and SWOT analysis enabled the researchers to obtain a comprehensive understanding of children's literacy conditions and to formulate evidence-based recommendations for strengthening literacy development through multimodal technology integration.

Findings and Discussion

Current Condition of Children's Literacy in North Konawe Regency

The findings indicate that children's literacy in North Konawe Regency demonstrates promising potential despite several challenges. Data collected through questionnaires and interviews across

three elementary schools reveal that students generally exhibit positive attitudes toward reading. Approximately 80% of respondents reported that they like or strongly like reading books, while only a small proportion (5%) expressed no interest in reading. Storybooks and novels emerged as the most preferred reading materials, followed by textbooks and comics. Nevertheless, students' reading frequency outside school remains inconsistent. Around 40% reported reading three to four times per week, whereas 25% read only once or twice weekly. These findings suggest that reading interest has not yet been translated into sustainable reading habits.

Reading habits also varied considerably among participants. Most students reported reading at home (60%), while only 20% regularly utilized school libraries. Daily reading duration generally ranged between 15 and 60 minutes, although approximately 10% spent less than 15 minutes reading each day. This variation indicates that literacy practices are influenced by students' learning environments, available time, and individual motivation.

Access to reading materials remains a significant concern. Approximately 40% of students did not own personal book collections, while 55% depended primarily on school libraries as their main source of reading materials. Furthermore, nearly 70% reported that they had never visited public libraries or community reading centers. These findings demonstrate that limited access to diverse reading resources remains one of the primary barriers to literacy development.

Environmental support for literacy was found to be relatively moderate. Although 70% of parents encouraged their children to read, only 25% regularly accompanied them during reading activities. Similarly, school literacy programs had not yet been implemented consistently. Approximately 60% of respondents indicated that literacy activities such as scheduled reading sessions were conducted only occasionally, while reading assignments outside classroom instruction were still relatively limited.

Several challenges were identified as barriers to literacy development. The most frequently reported constraints included limited reading facilities at home (40%), insufficient time allocated for reading (30%), and the limited availability of attractive and age-appropriate reading materials. These findings suggest that improving literacy requires not only strengthening students' motivation but also enhancing environmental support through better access to reading resources and more structured literacy programs.

Overall, the findings demonstrate that children's literacy development in North Konawe Regency is constrained primarily by environmental and infrastructural factors rather than students' reading interest. Therefore, comprehensive interventions involving schools, families, communities, and local government are required to establish sustainable literacy ecosystems.

Needs Analysis for Multimodal Technology-Based Literacy Development

The analysis of technology needs indicates that multimodal technology offers substantial opportunities for strengthening children's literacy development. However, successful implementation depends on several supporting factors.

Regarding technological infrastructure, only 40% of respondents considered existing facilities adequate for technology-supported learning, while one quarter reported that digital devices were either highly limited or unavailable. Tablets, laptops, projectors, and interactive audiovisual equipment were identified as the most urgent infrastructure needs.

Learning content also requires significant improvement. Interactive learning applications (45%), multimedia electronic books (30%), and educational videos (15%) were identified as the most

appropriate resources for supporting children's literacy. Respondents further emphasized the need for digital learning materials that reflect local culture and children's developmental characteristics.

Teacher readiness remains another important issue. Although most teachers possess basic digital competencies, approximately 60% reported only moderate confidence in implementing multimodal learning, while 20% experienced considerable difficulties. These findings indicate that systematic professional development programs are essential for improving teachers' digital pedagogical competencies.

Curriculum analysis revealed that multimodal technology has not yet been fully integrated into literacy instruction. Half of the respondents stated that technology integration remains partial, whereas one fifth reported that no systematic integration currently exists. Consequently, curriculum revision is necessary to incorporate digital literacy, multimedia learning resources, and technology-supported classroom activities.

Evaluation and monitoring systems also require improvement. Respondents suggested that literacy achievement should be evaluated not only through reading comprehension but also through students' engagement, digital literacy competencies, creativity, and participation in technology-supported learning activities. Meanwhile, limited digital devices, unstable internet connectivity, and insufficient teacher training remain the principal barriers to implementation.

The findings further reveal that technology supervision has not yet been consistently implemented. Half of the respondents indicated that children's technology use is monitored only occasionally, while many schools still lack formal policies governing educational technology. These conditions highlight the importance of establishing comprehensive institutional policies to ensure safe, responsible, and educationally meaningful technology use.

SWOT Analysis

The SWOT analysis indicates that North Konawe Regency possesses significant strengths for implementing multimodal technology-based literacy development, including growing technology availability, students' positive attitudes toward digital learning, and strong governmental commitment to educational improvement. However, weaknesses remain in technological infrastructure, internet connectivity, teacher competence, and locally relevant digital learning resources.

External opportunities include national digital education initiatives, collaboration with universities and educational technology providers, supportive government policies, and increasing parental awareness regarding digital literacy. Nevertheless, economic disparities, digital inequality, resistance to technological change, and limited culturally relevant digital content continue to threaten successful implementation.

These findings suggest that maximizing literacy development requires integrated strategies combining infrastructure improvement, teacher capacity building, curriculum innovation, and collaborative partnerships among schools, local government, higher education institutions, communities, and technology stakeholders.

Strategic Recommendations

Based on the findings, five strategic priorities are proposed.

First, schools should strengthen digital infrastructure by providing adequate devices, audiovisual equipment, and reliable internet access to support multimodal learning.

Second, educational stakeholders should develop interactive learning resources, including multimedia e-books, educational videos, digital storytelling, and locally contextualized learning materials that reflect children's cultural backgrounds.

Third, continuous professional development programs should be implemented to enhance teachers' competencies in digital pedagogy, multimedia learning design, and technology-assisted literacy instruction.

Fourth, literacy curriculum should be revised to integrate multimodal technology systematically while emphasizing critical thinking, creativity, communication, collaboration, and digital literacy competencies.

Finally, local governments, schools, parents, and communities should establish comprehensive policies for monitoring children's technology use, promoting digital citizenship, and ensuring safe learning environments. Such collaborative efforts will strengthen sustainable literacy ecosystems capable of preparing children for future educational and technological challenges.

Conclusion

The findings of this study indicate that children in North Konawe Regency generally demonstrate a positive interest in reading; however, this interest has not yet been consistently reflected in their reading habits. Limited access to reading materials, inadequate literacy facilities, insufficient parental and school support, and uneven technological infrastructure remain significant barriers to literacy development. The needs analysis further reveals that successful implementation of multimodal technology-based literacy requires improvements in digital infrastructure, development of contextualized learning resources, enhancement of teachers' digital competencies, curriculum integration, and the establishment of clear policies and monitoring systems to support safe and effective technology use. The SWOT analysis confirms that, despite existing challenges, North Konawe Regency possesses substantial opportunities to strengthen children's literacy through collaborative and technology-supported educational initiatives.

This study contributes to the growing body of knowledge on digital and multimodal literacy by providing a comprehensive needs analysis that integrates children's literacy conditions, technological readiness, institutional support, and strategic environmental factors within a single analytical framework. Unlike previous studies that primarily focused on evaluating instructional models or digital learning media, this research offers evidence-based strategic recommendations derived from empirical findings and SWOT analysis to support the sustainable implementation of multimodal technology in elementary education. The findings may serve as practical references for policymakers, school administrators, teachers, and other educational stakeholders in designing literacy programs that are responsive to local educational contexts while promoting digital transformation in schools.

This study has several limitations. The research was conducted in a limited number of elementary schools within North Konawe Regency; therefore, the findings may not fully represent literacy

conditions in other regions with different educational, cultural, or technological contexts. In addition, the study focused primarily on needs analysis rather than evaluating the effectiveness of specific multimodal literacy interventions. Future research is therefore recommended to develop and experimentally evaluate multimodal literacy learning models, investigate their long-term impact on students' literacy achievement and digital competencies, and involve broader samples across different regions to strengthen the generalizability of the findings and support evidence-based educational policy development.

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