Needs Analysis of Local Wisdom-Based Learning Media to Improve Science Literacy of Elementary School Learners

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Abstract

The low level of science literacy among elementary school students is caused by the limited availability of engaging and relevant learning media, as well as the minimal integration of local context. This study aims to identify the needs for effective and relevant learning media to enhance science literacy in elementary school students through a literature review, focusing on the characteristics of engaging media and the integration of local wisdom. The research method used is a literature review, collecting data from 20 relevant research articles. The data collection technique involves identifying and selecting articles based on appropriate keywords, while data analysis is conducted descriptively by examining previous research findings to identify patterns and significant findings. The results of the review show that interactive, contextual, and culture-based media can improve students' understanding and interest in science. Therefore, the ideal media for enhancing science literacy in elementary schools are interactive and contextual media that integrate local wisdom to make learning more engaging and culturally relevant.
Keywords: *learning media, science literacy, elementary school.*

Abstrak

Rendahnya literasi sains di kalangan siswa sekolah dasar disebabkan oleh keterbatasan media pembelajaran yang menarik dan relevan serta minimnya integrasi konteks lokal. Penelitian ini bertujuan untuk Tujuan penelitian ini adalah untuk mengidentifikasi kebutuhan media pembelajaran yang efektif dan relevan dalam meningkatkan literasi sains siswa sekolah dasar melalui kajian literatur, dengan fokus pada karakteristik media yang menarik dan integrasi kearifan lokal. Metode yang digunakan adalah studi literatur review dengan mengumpulkan data dari 20 artikel penelitian yang relevan. Teknik pengumpulan data melibatkan identifikasi dan seleksi artikel berdasarkan kata kunci yang sesuai, sedangkan analisis data dilakukan secara deskriptif dengan menelaah hasil penelitian terdahulu untuk menemukan pola dan temuan yang signifikan. Hasil kajian menunjukkan bahwa media pembelajaran interaktif, kontekstual, dan berbasis budaya lokal dapat meningkatkan pemahaman dan minat siswa terhadap sains. Sehingga media yang ideal untuk meningkatkan literasi sains di sekolah dasar adalah media interaktif dan kontekstual yang mengintegrasikan kearifan lokal untuk membuat pembelajaran lebih menarik dan relevan secara budaya.
Kata kunci: *media pembelajaran, literasi sains, sekolah dasar*

INTRODUCTION

Science literacy is one of the important skills to be developed in the current era of globalization and digitalization. Science literacy is not only related to the ability to read and understand scientific concepts, but also includes the ability to think critically, solve problems, and make decisions based on relevant scientific information (OECD, 2019). According to the results of the 2018 PISA survey, the science literacy skills of Indonesian students are still below the average of OECD countries, placing Indonesia at a low rank among participating countries (OECD, 2019). This indicates that primary school students in Indonesia still need to be given special attention in developing science literacy skills.

At the primary school level, science learning still faces many challenges. Field studies show that the low science literacy of learners is often caused by the lack of relevant and contextual learning media, especially those based on local wisdom and close to learners' daily lives. Existing learning media are often only text and images without interaction or practical approaches that involve learners directly in the learning process (Bybee et al., 2009). In line with these findings, research conducted by Setiawan (2020) states that most science learning media in Indonesia are still conventional and do not facilitate students' critical thinking skills and creativity.

Local wisdom is a potential that can be utilized in science learning, especially at the primary school level. Local wisdom not only offers rich cultural aspects, but also scientific concepts that are close to learners' daily lives, such as knowledge about medicinal plants, traditional ways of utilizing energy, and environmental concepts that can be linked to science literacy. However, there are still few studies that develop local wisdom-based media to improve learners' science literacy, especially at the elementary school level. In this case, digital-based media can also provide added value by providing a more interactive and interesting learning experience for students (Aini & Fauzi, 2021).

Observations in the field, especially in elementary schools in Masaran Sub-district, show that students' science literacy is still low, as seen from the inadequate results of daily tests. This is exacerbated by the lack of media that can accommodate students' learning needs. This data is also supported by a survey of several teachers, which revealed that science learning is often less attractive to students because it is considered difficult and boring (Sugiyanto, 2018). In line with this, research by Supriyadi (2021) found that media that are not contextualized and do not involve cultural or daily aspects of students make science learning difficult for elementary school students to understand.

Science literacy is not only important in the context of formal learning, but also in equipping learners with life skills to face the challenges of the modern world. As stated by Yore, Bisanz, and Hand (2023), science literacy also includes learners' ability to interpret, analyze, and apply science knowledge in everyday life. Therefore, more intensive efforts are needed to improve this ability through media that can help learners understand science concepts more practically and contextually.

Research on science literacy has been conducted in many countries with the aim of improving the scientific thinking skills of students from an early age (Bybee et al., 2009; OECD, 2019). However, the development of local wisdom-based media in science learning in Indonesia is still limited. A study by Supriyadi (2021) revealed that local wisdom is not only relevant, but also provides a cultural context that can make it easier for learners to understand the science concepts taught. In addition, Aini and Fauzi's (2021) study showed that digital-based media can increase students' motivation and engagement in science learning.

Constructivist learning theories introduced by Piaget and Vygotsky support learning approaches that actively involve learners. Vygotsky (1978) emphasizes the importance of social context in the learning process, which means that knowledge

is
more easily understood when it is linked to everyday experiences and local culture. In this context, learning media that utilize local wisdom can provide a more meaningful learning experience for learners.

Although there have been many studies addressing the development of science literacy at the basic education level, most studies focus on the application of certain learning methods or learning models without paying special attention to the media aspects that support learning. These studies often use conventional media that tend not to be contextualized or integrated with local cultural elements. Research conducted by Supriyadi (2021) and Sugiyanto (2018) shows that the use of media that is irrelevant to students' daily lives and the lack of integration of local wisdom lead to low student engagement in science learning. Therefore, there is a gap in this research, namely the need to develop relevant and local wisdom-based science learning media to improve science literacy. Learning media significantly influence science literacy by making complex concepts easier to understand and more engaging for students. Bybee et al. (2019) emphasize that effective media enhance learners' ability to connect with scientific phenomena in daily life. Contextual and interactive media, as highlighted by Keller (2020) and Ramdani & Rustaman (2018), also boost motivation and link learning to cultural relevance, making them essential tools for improving science literacy.

In addition, not many studies have specifically examined the need for media in digital-based science learning and local wisdom for elementary school students. Most previous studies are limited to developing digital or contextual-based media separately without combining them with local elements that can provide higher appeal and relevance for learners in certain areas.

The novelty of this research lies in its approach that combines local wisdom-based media needs with the aim of improving science literacy in elementary school students. By focusing on media needs analysis, this research seeks to understand the specific needs of learners and the characteristics of media that can increase learners' engagement and understanding of science with a contextualized approach.

The purpose of reviewing the literature above is to identify effective learning media that can enhance science literacy among elementary school students by addressing their needs for contextual, interactive, and culturally relevant resources. It aims to analyze the impact of various media, such as digital tools, gamification, augmented reality, and video-based learning, on students' understanding, engagement, and motivation in science education. Additionally, this review provides a theoretical and empirical foundation for developing innovative learning media that align with 21st-century educational demands, supporting educators and researchers in designing effective strategies to improve science literacy.

METHODS

This research uses a literature study or *library research* approach. According to Zed (2024), literature study is a research method that utilizes literature and documents as the main source of data. This approach focuses on collecting and analyzing information from various relevant scientific literature, such as journals, books, research reports, and other credible sources. Literature study allows researchers to explore previous research findings, relevant theories, and basic concepts related to science literacy and local wisdom-based learning media development. The main data in this research is secondary data for this research is derived from secondary sources, as defined by Sugiyono (2019), who states that secondary data is information collected by others, either through previous research findings or official reports. The sources for this study include scientific journals, textbooks, research reports, conference proceedings, and other academic

documents relevant to topics such as science literacy, learning media, and the integration of local wisdom in science education. This research references prominent international journals, including the Journal of Science Education, Science Education, and the Journal of Research in Science Teaching, alongside notable national journals such as the Journal of Science Education, Journal of Learning Technology, and the Journal of Local Wisdom. Following the recommendations of

Creswell (2014), who emphasizes the importance of using up-to-date references, this study prioritized publications from the last ten years to maintain relevance to current educational practices and trends.

The data collection technique in the literature study was carried out by document analysis, which is an analytical technique that aims to select, review, and analyze documents relevant to the research. According to Bowen (2009), document analysis is the process of reviewing documents or literature to find useful information, understand existing perspectives, and identify gaps and theoretical contributions. In this research, this technique includes three stages: searching, selecting, and organizing the literature.

RESULTS AND DISCUSSION

The literature review shows that learning media that are effective in improving science literacy in primary school learners generally have characteristics that are interactive, digital-based and relevant to learners' daily lives. Based on the results of the literature review, it appears that various types of learning media, ranging from visual and digital media to contextual and experiential approaches, have a significant impact on improving the science literacy of primary school students.

Research by Keller (2020) and Suparno (2019) shows that interactive and visual media can attract learners' attention and improve their understanding of abstract science concepts. This is in line with constructivist learning theory which states that learners learn better when they are actively involved in the learning process.

Ramdani & Rustaman (2018) and Putri & Rahmat (2021) emphasize the importance of integrating local wisdom in science learning. This approach not only increases the relevance of the subject matter for learners but also helps them understand and appreciate their culture and environment. This is in line with Vygotsky's view of the Zone of Proximal Development (ZPD), where learning is more effective when the material is adapted to the context familiar to learners.

Recent research, such as by Utami & Arifin (2019) and Rahmat & Nasution (2022), shows that technologies, such as augmented reality and mobile applications, can improve learners' engagement and access to science materials. This is in line with the times that increasingly lead to the use of technology in education, giving learners the opportunity to learn independently and interactively.

Ningsih & Fatmawati (2022) and Amalia & Fadhilah (2022) show that project-based learning and gamification models can increase learners' motivation and engagement. This method supports motivation theory which states that fun and relevant learning can increase learners' interest in learning further.

Sari & Amelia (2023) emphasized that cooperative learning can strengthen learners' social skills while improving science literacy. This is in line with Bandura's social cognitive theory, which emphasizes the importance of social interaction in learning.

Table 1. Review Jurnal

Researcher and Year	Journal Title	Learning Media	Results
Bybee et al. (2019)	The importance of scientific literacy in 21st-century education	Context-based approach	Science literacy helps learners understand the scientific phenomena around them.
Keller (2020)	Motivational design for learning and performance: The ARCS model	*ARCS Model-based* interactive media	Media that are interactive and relevant to learners' lives increase motivation and engagement.
Suparno (2019)	The effect of visual media in science learning for elementary students	Visual media	The use of visual elements captures learners' interest and helps understand abstract science concepts.
Iskandar (2019)	The impact of digital media on students' understanding of science	Interactive digital media	Digital media makes it easier for students to understand abstract science concepts through visualization.
Suyanto (2017)	Challenges in science literacy among Indonesian elementary students	Contextual media	Students' science literacy is low due to the lack of media relevant to everyday life.
Ramdani & Rustaman (2018)	Integrating local wisdom in science learning for elementary students	Local wisdom-based media	The local culture-based approach increases learners' interest in the learning material.
Utami & Arifin (2019)	Augmented reality for science learning in primary schools	Augmented reality (AR) media	AR-based media improves learners' understanding and interest in abstract science concepts.
Hermawan (2020)	Video-based learning in science for elementary students	Video media	The use of videos as science media increases learner engagement and understanding of concepts.
Putri & Rahmat (2021)	The need for contextual media in science education	Contextual media and local culture	Learners need media that combines visuals, audio and local context for stronger understanding.
Wahyuni (2022)	Digital media with local illustration for science literacy	Digital media with local illustrations	Local illustration-based media improves science literacy compared to conventional media.
Mulyana & Adi (2020)	The Effect of Interactive Media on Science Learning Outcomes	Interactive media	Interactive media improves students' learning outcomes in science lessons.
Yani & Sari (2021)	Contextual Teaching and Learning in Science Education	Contextual approach	Contextual learning improves learners' understanding of science concepts.
Devi & Agustin (2021)	The Role of Digital Storytelling in Science Learning	Digital storytelling media	Digital storytelling promotes learner engagement and understanding of science materials.

Rahmat & Nasution (2022)	Using Mobile Learning to Improve Science Literacy	Mobile-based learning media	The use of mobile apps increases learners' access to science materials.
Ningsih & Fatmawati (2022)	The Effect of Project-Based Learning on Science Literacy	Project-based learning	The project-based learning model significantly improved students' science literacy.
Amalia & Fadhilah (2022)	Gamification in Science Learning for Elementary Students	Gamification media	Gamification makes science learning more fun and interactive.
Indah & Kurniawan (2023)	Role of Experiential Learning in Science Education	Experiential learning	Experiential learning improves students' understanding of science concepts.
Sari & Amelia (2023)	Impact of Peer Learning in Science Education	Cooperative learning	Cooperative learning improves students' science literacy and social skills.
Maulana & Lestari (2023)	The Integration of Technology in Science Curriculum	Integration of technology in the curriculum	The integration of technology in science learning improves the quality of learning and learning outcomes.

The analysis of the journal findings highlights the crucial role of learning media in improving science literacy among elementary school students. Studies such as those by Bybee et al. (2019) and Suyanto (2017) emphasize the importance of contextual approaches in learning media. Media that connect with everyday life enable students to better understand scientific phenomena around them. This is further supported by Putri & Rahmat (2021), who found that combining visuals, audio, and local cultural elements helps students grasp science concepts more deeply.

Moreover, the use of digital and interactive technologies has proven effective in enhancing science literacy. Research by Wahyuni (2022) and Iskandar (2019) shows that digital media with local illustrations or interactive visual elements aids students in comprehending abstract science concepts. Studies on augmented reality (AR) by Utami & Arifin (2019) and mobile learning applications by Rahmat & Nasution (2022) further underline how technology provides engaging learning experiences and greater accessibility for students.

In summary, the need for relevant, interactive, and culturally embedded science learning media is critical to addressing the challenges of low science literacy among Indonesian students. Innovative media such as gamification (Amalia & Fadhilah, 2022), digital storytelling (Devi & Agustin, 2021), and video-based learning (Hermawan, 2020) have been shown to enhance student engagement and understanding of science materials. Therefore, developing innovative and student-centered learning media is a strategic step toward fostering more effective science education in elementary schools.

CONCLUSIONS

The literature review shows that the use of diverse and relevant learning media, such as visual, digital and experiential media, significantly improves the science literacy of primary school learners. The integration of local wisdom and active learning models, such as project-based learning and gamification, also proved effective in increasing learners' interest and understanding. Therefore, the development of innovative and contextualized learning media is urgently needed to create a more meaningful learning experience. Further research is needed to explore the application of these media in the curriculum and evaluate their impact on learners' science literacy on an ongoing basis.

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