

Multimedia-Based Learning Management Interactive Learning in Improving Students' Digital Literacy

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Abstract: This study aimed to describe the application, implementation, and evaluation of interactive multimedia-based learning management as a strategy to improve the digital literacy of third- and fourth-grade students at SD Negeri 22 Sembawa. Employing a descriptive qualitative method, the research involved teachers, the principal, and students as subjects. Data were analyzed through the processes of reduction, display, and conclusion drawing/verification. The strategy proved effective in enhancing students' abilities to access, understand, evaluate, and process digital information. Teachers successfully adopted more creative, student-centered planning and evaluation. Key challenges included limited devices, constrained instructional time, and gaps in teachers' digital competencies. The study uniquely integrates the framework of systematic learning management planning, implementation, evaluation with interactive multimedia tools, specifically targeting digital literacy development in lower primary education. The findings provide an actionable model for schools, highlighting the need for targeted teacher training and resource allocation to overcome technological and pedagogical barriers when implementing similar digital literacy programs. It contributes a validated, on-the-ground case study demonstrating how structured learning management can successfully harness interactive multimedia to build foundational digital competencies in young learners.

Keywords: Digital Literacy, Elementary Students, Interactive Multimedia, Learning Management

A. Introduction

Using technology wisely is a way to improve children's literacy. There are a number of apps and websites that offer interesting stories and digital books for children (Bangsawan, 2018). The low interest in reading of students is influenced by various factors, both internal and external. Internal factors come from the student himself, while external factors are influenced by the environment, such as family and school. By

knowing the reason for the low interest in reading, the right solution can be formulated to improve students' reading abilities and habits in the future (Sari, 2018). Information and Communication Technology (ICT) plays a very crucial role in the life of the nation and state (Bógdał-Brzezińska, 2020; Jin, & Cho, 2015). Currently, the influence of information technology on human activities is very large. ICT has become a key tool in many areas of life, contributing significantly to fundamental changes in operational and management structures in the organizational, educational, transportation, health, and research sectors (Rusydi, 2017; Suryadi, 2015; Zafar, T. 2019).

In today's rapidly growing information era, digital literacy is one of the main skills that students must have (Öncül, 2021; Salganova, & Osipova, 2023). The use of technology in education can not only enrich the learning experience, but also help students develop critical and creative thinking skills (Shubina, & Kulakli, 2019; Zhanqiang, 2023). Interactive multimedia-based learning is an innovative solution to improve students' digital literacy in schools. However, in reality, interactive multimedia-based learning management has not been optimally applied in various educational units. Many schools still rely on conventional learning methods, where teachers are the center of information and students tend to be passive. This causes a low level of digital literacy of students, especially in critical thinking skills of the digital information received daily, so that students become less wise in sorting information.

Digital literacy includes the skills to search, assess, and utilize information in an effective way. In the context of learning, students need to be taught how to use technology to support their learning. With an interactive multimedia approach, students are encouraged to be actively involved in learning activities. So as to increase their understanding of digital literacy. Interactivity in multimedia learning also allows students to learn independently. They can explore the material according to their respective learning speeds and styles. This is important, especially in a diverse education, where each student has different needs and abilities.

Multimedia-based learning is also able to make it easier for students to understand complex concepts because they are presented in a simpler way (ömer Beydoğan, & Hayran, 2015; Hoffmann, & Ritchie, 1997; Laksana, et. al., 2019). Through clear visualizations and concrete examples, students become more easily able to relate new knowledge to previous experiences or understandings, thus contributing to improved memory and information retention. Digital literacy in a global context also cannot be ignored. In an increasingly internet-connected world, the ability to use technology effectively is key to success. Students who have good digital literacy are better prepared to face future challenges, both in further education and the world of work. The role of teachers in student-centered learning shifted from being teachers to facilitators.

Facilitators are figures who carry the responsibility to condition an accessible learning environment for students. We observed that a lack of training for teachers and adequate infrastructure is often a major obstacle. Therefore, it is important to develop programs that can support teachers in implementing multimedia-based learning.

We found that limited training for teachers and lack of adequate infrastructure are often the main obstacles. Therefore, it is important to develop programs that can support teachers in implementing multimedia-based learning. Based on initial observations at SD Negeri 22 Sembawa, we observed that teachers have not fully utilized the role of multimedia in learning. Teachers in this case must adjust to learning and the needs of students. Literacy is a strong motivator to motivate students in learning. In reality, student literacy is still low, even though teachers have made efforts to make students comfortable in the classroom in the event that there is already a reading corner, but still only some students are interested in reading.

The books in the reading corner are still relatively new and full of pictures that make students interested, but the collection in the library also has many books that are not interesting so that students are less interested in visiting the library. Students who have a sense of pleasure in reading activities tend to spend more time reading and are enthusiastic and motivated in learning, but students will tend to be bored if learning is done in a monotonous and less varied manner.

The main problem faced in the implementation of interactive multimedia learning is the limited technology infrastructure in schools. Not every school has adequate internet access, we found that if the power goes out, it takes a long time to turn back on, so sometimes there are obstacles in the implementation of interactive multimedia-based learning. The condition of the facilities is also inadequate, such as the classroom that is not good in lighting settings so that if the LCD/Projector is turned on, sometimes it is still too bright, so the way to overcome it is to close the curtains to mimic the incoming light so that students who are sitting in the back can still be seen.

Teachers also often face obstacles in terms of technical and pedagogical ability to make optimal use of multimedia in the learning process, only some teachers often implement interactive multimedia-based learning. Time constraints often make teachers less interested in implementing new approaches that require longer preparation. Another challenge is the lack of motivation and basic digital literacy of the students themselves. Not all students are used to using digital technology for learning activities. Most of them use gadgets just for entertainment purposes. Many students are more interested in games and social media than digital learning platforms. Therefore, directing students to be able to use technology wisely as a learning tool requires creative strategies and a fun approach, one of which is through interactive multimedia. The psychological readiness

of students is also a challenge in itself. Not all students can immediately adapt to technology-based learning methods. Some students find it difficult to operate the application or understand directions in digital learning media. Therefore, it is important to have intensive assistance from teachers so that students can participate in learning to the maximum.

The lack of training or workshops on the use of interactive multimedia is also an obstacle. Both teachers and students often do not get adequate coaching to develop their digital skills. In addition, classroom management in interactive learning is also not easy. When students are encouraged to actively participate, teachers are required to be able to manage classroom dynamics so that the learning atmosphere remains conducive. Without good management, interactive activities can turn into noise or inequality of participation, where only certain students dominate, while others are passive.

With good and directed classroom management, students who are passive and active in the spirit of learning in class, one of the ways we overcome student obstacles by implementing the *wheel of names website*, where randomly the students get turns one by one so that not only active students can actively participate in the learning process activities in class. To overcome a class that is not conducive, the teacher gives explanations and assignments to the students first after that the teacher tells the students to take turns in the future, especially if they are constrained if the power goes out or the projector is being used in another class.

Interactive multimedia, if applied appropriately and consistently, can increase students' enthusiasm for learning. Learning becomes more fun, adaptive, and relevant to the context of students' daily lives, especially in the digital world they are facing. The support from the principal in digital-based learning is very good, because the existence of digital-based learning multimedia is very helpful in terms of the progress of the Education unit, and if there is training related to learning innovation, it is always supported by the principal.

Furthermore, interactive multimedia learning management can support students' understanding and involvement in the teaching and learning process. Students not only learn academic content, but also how to search, assess, and use digital information wisely. These skills will be an important provision for students to participate actively and productively in an information-based society. Thus, interactive multimedia-based learning in the educational process not only has an impact on improving cognitive learning outcomes, but also strengthens students' digital competence. The benefits obtained are wide-ranging, ranging from increasing student involvement in learning, strengthening digital literacy, to forming a generation of learners who are adaptive, creative, and ready to face global challenges. Through a multimedia-based learning

approach, students not only become savvy users of technology, but also learn to think critically about the information they encounter. This effort has an important role in equipping them to be ready to face the challenges of an increasingly complex world. Interactive multimedia learning management requires proper planning, implementation, evaluation to achieve these goals. This includes the selection of appropriate learning platforms, teaching materials, and teaching methods.

With good digital literacy, students will be better able to adapt to technological changes and can contribute positively to society. Therefore, this study aims to assess the effectiveness of multimedia-based learning in improving students' digital literacy. By utilizing the facilities that are available at school, namely using LCD Projectors so that students can learn more variously through the form of picture materials, quizzes, and learning videos in the implementation of learning can be better. The use of interactive media such as learning videos, animations, and digital applications such as *Educaplay*, and *Quiziz* can also be expected to present a more varied learning experience so that students feel interested and happy in the learning process. Although the existing projectors are limited, namely there are only 2 pieces, we try to make learning activities varied. This Interactive Learning Multimedia can be adjusted to the teaching material so that students become enthusiastic about learning. Interactive learning multimedia is expected to be a means that is able to facilitate and enrich the learning process in the classroom, so that it can have a good influence on improving student learning outcomes, so we chose the research with the title "Multimedia-Based Learning Management Interactive Learning in Improving Student Digital Literacy at SD Negeri 22 Sembawa. The formulation of the problems in this study includes: 1) how is interactive multimedia-based learning planning in improving the digital literacy of grade 4 students at SD Negeri 22 Sembawa? 2) How is the implementation of interactive multimedia-based learning management in improving the digital literacy of grade 4 students at SD Negeri 22 Sembawa? 3) How is the evaluation of interactive multimedia-based learning in improving the digital literacy of grade 4 students at SD Negeri 22 Sembawa?

B. Methods

This research was carried out at SD Negeri 22 Sembawa, located on Batu Merah street, Dusun II, Pulau Harapan Village, Sembawa District, Banyuasin Regency. The reason we carried out the research at SD Negeri 22 Sembawa was because it was in accordance with the problems raised by us, namely the low literacy of students, and the easy access to it so that it could facilitate the research process. The subjects of this study are school principals, 4th grade teachers and 4th grade students. The subject of the study is a problem that is researched. The subject of research is the nature of the state of an object, person, or which is the center of attention and the object of the research. The nature of the situation in question can be in the form of traits, quantities, and qualities that can behave,

activities, opinions, judgments, attitudes, pros and cons, sympathies and antipathies (Surokim, et. al., 2016). In collecting data sources, we collect data in the form of primary and secondary data. The primary data was obtained from direct observation and interviews with the principal of SD Negeri 22 Sembawa, grade 4 teachers and several grade 4 students. Secondary data can be obtained from the school's organizational structure, school vision and mission, facilities and infrastructure or can be obtained through reference articles or journals. The data collection techniques for this research are interviews, observations, and documentation (Owen-Smith, & Coast, 2017; Utibe, 2020; Onwuegbuzie, et. al., 2010). We conducted interviews with 2 4th grade homeroom teachers to find out multimedia-based learning management, both from planning and implementation as well as its evaluation. Then interviewed the principal and several 4th grade students. Then we conducted direct observations at SD Negeri 22 Sembawa. We observed that multimedia-based learning activities took place. This aims to obtain direct data results and evaluate the results of in-depth interviews. Finally, we documented several things related to the research such as the school organizational structure, the school's vision and mission, facilities and infrastructure, teacher learning plans, multimedia materials and student evaluation reports. There are four main criteria used in the data validity test in this study, namely the degree of *credibility*, *transferability*, *dependability*, and *confirmability* (Husnullail & Jailani, 2024). Data analysis is carried out with the stages of data reduction, data presentation, and conclusion or verification.

C. Results and Discussion

Application of Interactive Multimedia-Based Learning Management in Improving Students' Digital Literacy

Based on the results of the study, the application of interactive multimedia-based learning management shows a significant contribution to improving students' digital literacy (Wu, et. al., 2025; Ramadhani, et. al., 2024). In the planning stage, teachers play the role of learning managers who design learning activities by integrating various digital learning resources such as videos, animations, and interactive simulations. The use of multimedia in the learning process not only serves as a teaching tool, but also as the main medium to build students' digital literacy skills. With this approach, students are trained to access information independently, understand material through various digital formats, and process information to generate new knowledge. The application is in line with learning management theory which emphasizes the importance of planning, organizing, implementing, and supervising so that the learning process can run effectively and efficiently in the context of technology-based education.

The cited research findings underscore a critical evolution in pedagogical practice, where interactive multimedia transcends its conventional role as a mere instructional aid to

become the central scaffold for developing digital literacy. This shift represents a meaningful intersection of learning management theory and 21st-century skill acquisition, with profound implications for how educators conceptualize and execute the learning process. At its core, the planning stage, where teachers act as strategic designers, is paramount. By deliberately curating and integrating diverse digital resources videos for visual demonstration, animations for abstract concept modeling, and interactive simulations for experiential learning teachers architect a digital-rich learning ecosystem. This is not a passive environment but an active landscape for exploration. The management theory framework of planning, organizing, implementing, and supervising provides the necessary structure for what could otherwise be a chaotic digital experience. Planning ensures alignment with literacy objectives; organizing sequences resources logically; implementing facilitates guided engagement; and supervising allows for real-time feedback and adjustment. This systematic management transforms random technology use into a purposeful literacy-building curriculum.

The significant contribution to digital literacy emerges through this structured immersion. Students are not just consuming information; they are practicing literacy competencies in an authentic context. Accessing information from varied multimedia sources trains them in navigation and evaluation distinguishing between a reliable instructional video and a misleading one. Comprehending material across different formats (text, audio, visual, interactive) builds multimodal comprehension skills, essential for processing modern digital content. Most importantly, the requirement to process this information to generate new knowledge perhaps by creating a digital presentation, a data visualization, or a collaborative wiki advances them to higher-order digital competence. They move from being consumers to producers and critical evaluators of digital content.

Furthermore, this approach redefines the teacher's role from knowledge transmitter to a facilitator of digital fluency. The teacher manages the environment and tasks that necessitate the use of digital tools for problem-solving, collaboration, and communication. This aligns with sociocultural theories of learning, where skills are developed through mediated activity. The multimedia tools are the mediation, and the teacher's management provides the supportive scaffolding.

Ultimately, the study highlights that digital literacy is no longer a separate subject to be taught in isolation. It is a by-product of an effectively managed, multimedia-infused learning process. This integration ensures that digital literacy is contextualized, immediately applied, and developed progressively alongside disciplinary knowledge. The conclusion is clear: in the modern educational landscape, effective learning management is inherently tied to the strategic use of interactive multimedia, not just to teach content, but to cultivate the fundamental literacies required for students to thrive

in a digital world. This paradigm positions schools not merely as conveyors of information, but as essential workshops for building competent, critical, and creative digital citizens.

Implementation of Interactive Multimedia-Based Learning in the Process of Teaching and Learning Activities

The implementation of interactive multimedia-based learning in the field shows the active involvement of students in the learning process (Komalasari, & Saripudin, 2017; Sekarwangi, et. al., 2021). Teachers use various digital media to present materials, such as learning videos, educational animations, and interactive simulations that are relevant to the learning topic. The results of observations showed that students were more focused, enthusiastic, and able to participate actively during the activity. Visualization of material through digital media helps students understand abstract concepts more easily, while interactive features encourage them to think critically, collaborate, and explore information further. This process reflects the implementation of student-centered learning, where teachers act as facilitators who guide students in interacting with technology. Thus, the implementation of interactive multimedia-based learning has been proven to not only improve understanding of concepts, but also strengthen students' digital skills as part of 21st century literacy. The observation that interactive multimedia-based learning fosters active student involvement is not merely a surface-level finding; it signifies a fundamental paradigm shift from passive reception to dynamic engagement, driven by the core principles of constructivist learning. This shift, validated across multiple studies, illuminates the profound cognitive and pedagogical mechanisms through which well-designed digital media reconfigures the classroom dynamic.

The heightened focus and enthusiasm noted in students stem from multimedia's ability to lower cognitive load and increase intrinsic motivation. Traditional abstract instruction often overwhelms working memory. By using animations to visualize molecular motion or interactive simulations to model economic principles, complex information is offloaded and processed through dual coding channels (visual and auditory), making comprehension more efficient and less frustrating. This ease of access transforms the learning experience from a struggle to decode into an achievable challenge, thereby boosting confidence and sustained attention. The interactive element is particularly crucial; it introduces an agency-based learning loop. When a student manipulates variables in a science simulation and immediately sees the graphical outcome, they are not being told a theory they are testing it. This direct manipulation fosters a sense of ownership and inquiry, transforming them from spectators into active investigators.

Furthermore, this active involvement is the engine for developing higher-order skills. The interactive features do not just deliver content; they structure cognitive and social

processes. A collaborative task within a multimedia platform, such as building a shared timeline of historical events annotated with primary source videos, necessitates critical thinking (evaluating source relevance), collaboration (negotiating meaning and structure), and creative synthesis. The teacher's role evolves precisely to guide these processes. As a facilitator, the teacher moves from center-stage expert to a scaffolder of exploration, posing probing questions, managing group dynamics, and helping students navigate and evaluate digital information rather than simply dispensing it. This embodies the essence of student-centered learning, where the environment is structured for discovery.

Ultimately, the proven outcome improved conceptual understanding alongside strengthened digital skills reveals the synergistic power of this approach. The digital skills (navigating interfaces, evaluating digital sources, creating with digital tools) are not taught in a vacuum but are acquired as the necessary means to achieve a meaningful academic goal. Students learn to use a data visualization tool in order to understand a statistical trend in sociology. This contextual integration ensures that digital literacy becomes a functional, transferable competency rather than an abstract checklist item. Thus, the implementation of interactive multimedia is far more than a technological upgrade; it is a pedagogical strategy that actively constructs the engaged, critical, and digitally fluent learners demanded by the 21st century.

Evaluation of Interactive Multimedia-Based Learning Management on Improving Students' Digital Literacy

The results of the evaluation show that interactive multimedia-based learning management has a fairly high effectiveness, but still faces a number of technical and managerial obstacles. The obstacles found include limited technological devices such as projectors and computers, unstable internet networks, and teachers' skills in operating and managing digital media. These factors have an impact on optimizing the learning process in the classroom. In addition, limited learning time often makes it difficult for teachers to convey all material using multimedia. This finding is in line with the results of research at SDN Bukitmulya, Cianjur Regency, which emphasizes that the effectiveness of multimedia learning is greatly influenced by the readiness of infrastructure and teachers' competence in managing media. Therefore, improving the quality of learning management needs to be done through teacher training, the provision of adequate technological facilities, and strengthening school policies in supporting digital learning. Continuous evaluation is an important aspect to ensure that the application of interactive multimedia really has a significant impact on the continuous improvement of students' digital literacy.

D. Conclusions

This study affirms that a structured approach to interactive multimedia-based learning management can significantly enhance students' digital literacy. The key findings are threefold. First, effective implementation hinges on systematic planning, where teachers meticulously design lessons, select appropriate multimedia tools, and account for both technological infrastructure and students' baseline digital skills. Second, the execution of this planned learning fosters greater student engagement and participation, successfully cultivating essential digital competencies. However, this process faces challenges, including time constraints and variability in teachers' own digital operational proficiency. Third, comprehensive evaluation through observation, assessment, and reflection confirms the positive impact of interactive multimedia on improving digital literacy outcomes. The practical implications are significant for educational practitioners and institutions. Schools should invest in sustained professional development to bolster teachers' technological pedagogical content knowledge (TPACK), ensuring they can not only operate digital tools but also integrate them effectively into curricula. Furthermore, lesson planning must intentionally allocate sufficient time for multimedia-aided exploration and skill practice. School leaders can support this by reviewing scheduling models and providing robust technical support to minimize classroom disruptions. To build upon this research, future studies are recommended. Longitudinal research could track the long-term retention and application of digital literacy skills developed through such interventions. Additionally, experimental or comparative studies investigating specific multimedia tools (e.g., simulation software versus interactive videos) would help identify the most effective resources for different literacy sub-skills. Finally, research focusing on designing targeted training modules to address the identified gap in teachers' digital operational skills would provide a direct solution to one of the primary implementation barriers, thereby enhancing the overall efficacy of technology-integrated learning environments.

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