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Media-Based Learning Management Using Flipbook and Dakota to Improve Elementary Students' Literacy and Numeracy

Jainab[1*], Srie Faizah Lisnasari[2], Datten[3], Pelista[4]
[1,2,3]Program Studi Pendidikan Guru Sekolah Dasar, Universitas Quality, Medan, Indonesia
[4]Program Studi Pendidikan Guru Sekolah Dasar, Universitas Quality Berastagi, Indonesia
Corresponding Author: Jainab jainabnaibaho1@gmail.com

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A B S T R A C T
This study was motivated by the low literacy and numeracy skills of elementary school students in Medan, where approximately 35% of students have not met the minimum literacy standards. Additionally, the numeracy skills of fourth-grade students at SDN 064960 Medan Polonia remain at a low to moderate level. One of the contributing factors is the inadequate use of appropriate learning media. Therefore, this study aims to analyze the impact of Flipbook media on the literacy skills of second-grade students at UPT SD Negeri 060938 Medan Johor and Dakota media on the numeracy skills of fourth-grade students at SDN 064960 Medan Polonia. This research employs a quantitative quasi-experimental method with a pretest-posttest control group design, involving 40 second-grade students and 58 fourth-grade students. The results indicate a significant improvement after using learning media. In the literacy study, the posttest average score increased from 50 to 60.5 in the control class and from 48 to 85.5 in the experimental class.

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INTRODUCTION

The use of technology in learning is expected to help students understand the material better and improve the quality of education, especially in terms of reading literacy. Reading literacy is not just the technical ability to read, but also includes understanding, interpreting, and analyzing the information read, which is very important to develop from an early age. However, the challenges in improving reading literacy are still significant. According to the PISA 2022 report, the average reading literacy score of Indonesian students is only 379, far below the OECD average of 487. In North Sumatra, around 40% of students have not achieved the expected reading literacy standard, while in Medan City, data from the Education Office in 2020 showed that 35% of elementary school students had not met the minimum standard for reading ability. The results of observations at UPT SD Negeri 060938 Medan Johor on August 28, 2024 also showed the low reading literacy skills of grade II students, with an average text comprehension score of only 45.5 for grade II-A and 45.7 for grade II-B.

Numeracy skills are basic skills that are very important in everyday life and in solving more complex problems. Numeracy involves not only the ability to count, but also understanding patterns, number relationships, and the application of mathematical concepts in various situations. Unfortunately, in Indonesia, students' numeracy skills are still relatively low. Based on the results of the 2018 PISA, Indonesian students' mathematics scores are still below the international average set by the OECD. In addition, the 2023 Indonesian Education Report Card report shows that only 46.67% of elementary school students have numeracy competencies above the minimum limit. Observation results at SDN 064960 Medan Polonia show that most fourth-grade students have difficulty understanding numeracy concepts, such as solving problem-based questions, understanding number relationships, and interpreting numerical data. One of the contributing factors is the learning method which is still conventional and the lack of use of media that helps students understand concepts more concretely.

To overcome challenges in literacy and numeracy, an innovative learning approach is needed. One solution that can be applied is the use of Flipbook media as an interactive digital learning media in improving students' reading literacy. Flipbooks allow students to interact with interesting content such as animations, images, and sounds, so that they can increase their interest in reading and understanding. Meanwhile, in numeracy learning, the use of Dakota Media (Dakon Matematika) can be an effective alternative. This media is based on traditional games that are modified to suit basic numeracy material, allowing students to learn through direct experience and active interaction in groups. Therefore, this study aims to analyze the effect of using Flipbook Media on the literacy of grade II students at UPT SD Negeri 060938 Medan Johor and Dakota Media on the numeracy of grade IV students at SDN 064960 Medan Polonia. With a quantitative approach based on quasi-experiments, this study is expected to provide an alternative learning method that is more interactive and contextual for elementary school students.

LITERATURE REVIEW

Reading literacy is a person's ability to understand, use, evaluate, and reflect on various types of texts to achieve goals and participate in society. According to Tarigan (2021:45-67), reading literacy does not only include understanding printed texts, but also skills in interpreting and analyzing digital texts critically. Nurgiantoro (2022:101-120) added that reading literacy must be adjusted to the development of information technology, while Ruhimat (2023:55-70) emphasized the importance of using digital media wisely in understanding and using information effectively.

One of the learning media that supports reading literacy is Flipbook, which is an interactive digital media that resembles a printed book with additional animation and digital navigation features. Supriyadi (2020:112-130) defines Flipbook as a digital media that allows users to flip through pages with animation effects and interactive navigation. Sutanto (2021:89-105) explains that Flipbook simulates the experience of reading a printed book with a more dynamic appearance, while Yuliana (2022:56-70) adds that features such as text search and multimedia can improve the overall reading experience. With interactive visual characteristics, ease of access, and text and audio support, Flipbook is an effective tool in learning.

The use of Flipbooks in learning has been proven to improve students' reading literacy. Putri (2020) found that the use of Flipbooks increased students' text comprehension by 28% compared to conventional methods, while Haryanto (2021) noted an increase of 32%. Anggraeni (2019) and Saraswati (2020) reported a similar increase of 30%, while Wijaya (2022) noted an increase in text comprehension of up to 35% after using interactive Flipbooks. Other benefits include increased reading interest, accelerated text comprehension, reading fluency, and students' memory in understanding the material presented.

However, there are several challenges in implementing Flipbook, such as limited access to technology, lack of teacher training, and limited availability of materials. To overcome this, the provision of devices in schools, teacher training on technology, and development of Flipbook content according to the curriculum need to be done (Risnawati et al., 2019; Rauf et al., 2021). In the context of learning, Flipbook can be applied to the theme "Living in Harmony at Home and in the Community," which aims to instill values of tolerance and respect for cultural diversity in Indonesia (Malo, 2023).

Dakota media is a tool specifically designed to improve students' numeracy skills. Wahyuni et al. (2024:3093) stated that Dakota is a new innovation in visual media for learning mathematics. Munawarah et al. (2022:412) added that Dakota media is a modification of the traditional Indonesian game, namely dakon. With a fun approach, Dakota is applied in learning the Least Common Multiple (LCM) and the Greatest Common Factor (FPB). Asri and Muthi (2024:201) explained that the Dakota method allows students not only to understand mathematical concepts theoretically, but also to apply them in the context of interactive games, thereby increasing their understanding and involvement in learning.

The steps for using Dakota media have been explained by Rauf et al. (2021:143). To determine the FPB, students are given beads and asked to find the divisor of the number by inserting the beads into the Dakota container. This process continues for other numbers until the greatest common factor is found. Meanwhile, in determining the LCM, students insert beads into the number box to find multiples of a number. To facilitate implementation in the classroom, teachers need to understand the concepts of LCM and FPB, prepare Dakota media, and condition the class before starting to teach the material. Teachers can also replace the beads with plastic straws to make them more flexible and easier to use.

Dakota media has advantages and disadvantages in its use. Khoirunnisa (2014) stated that Dakota can improve students' creativity, train communication in groups, and motivate them in learning mathematics through an approach that resembles the game of congklak. However, this media has disadvantages, such as its large size so that it is less flexible to carry, and limitations in calculating LCM and FPB because the number of bowls used cannot be more than 24. To overcome this, Dakota media can be made in a smaller size, or replace the bowls with more practical objects. In addition, a basic understanding of multiplication and division must be given before students use this media so that they do not experience difficulties.

In general, numeracy is the ability to apply mathematical concepts in everyday life. Kemendikbud (2020) in Tenny et al. (2021:22) defines numeracy as the ability to think using mathematical concepts, procedures, facts, and tools to solve contextual problems. Numeracy is not just about understanding numbers, but also helps students make the right decisions. According to Herman et al. (2024:65), numeracy skills are a fundamental knowledge base in solving mathematical problems effectively. Thus, Dakota media is one of the learning innovations that can improve students' numeracy skills.

METHODOLOGY

This study uses a quantitative method with a quasi-experimental design through a pretest-posttest control group design. This study aims to analyze the effect of various innovative learning methods on elementary school students' literacy and numeracy skills. The research was conducted in two periods, namely on October 29 - November 1, 2024 for numeracy research and November 18-19, 2024 for literacy research. The research sample consisted of several groups of students divided into experimental and control groups to facilitate a more valid comparison of results.

Numeracy research was conducted in two elementary schools in Medan City. In UPT SD Negeri 064026 Medan Tuntungan, the research was conducted on fifth grade students with a total of 51 students, where 27 students in the experimental class were taught using the number place value board media, while 24 students in the control class did not use the media. In UPT SDN 060972 Simalingkar B, the research involved 42 fifth grade students, with 22 students in the experimental class using the Digital Educational Game, while 20 students in the control class continued to use the conventional method. In addition, numeracy research was also conducted on first grade students in UPT SD Negeri

064026 Medan Tuntungan with a total of 32 students, where 16 students in the experimental class learned using the environment-based gamification method, while 16 students in the control class did not receive the treatment.

Meanwhile, literacy research was conducted at UPT SDN 060938 Medan Johor on grade II students with a population of 40 students divided into two parallel classes. This study aims to test the effect of using Flipbook media on students' reading literacy skills. The research instruments include literacy tests, observations, and interviews designed to obtain comprehensive data on the development of students' literacy skills. The research procedure includes planning, implementation, and analysis of results, with mapping of experimental and control classes to ensure the validity of the research results. Research preparation includes compiling test instruments and making Flipbook media as a learning aid.

The main research instrument was a numeracy and literacy test in the form of essay questions and observations. Data collection was carried out through several stages, namely instrument preparation, pretest implementation, treatment, posttest implementation, and data analysis. The collected data were analyzed using various statistical techniques, starting with prerequisite tests such as normality and homogeneity tests to ensure that the data met the required statistical assumptions. Furthermore, the average pretest and posttest scores were calculated for each group. To test the hypothesis, an inferential statistical test was used to determine whether there was a significant difference between the experimental and control groups in improving students' literacy and numeracy skills.

RESEARCH RESULT AND DISCUSSION

Before being given treatment in the form of using Flipbook and Dakota media in learning, a pretest was first conducted to measure students' initial abilities. The results can be seen as follows:

In the class that will be known the effect of using Flipbook on numeracy ability, it can be seen that the average score of class II-A is 50, which shows that overall, the literacy ability of students in that class is at the basic level. Meanwhile, class II-B has an average score of 48, which indicates that the literacy ability of students in class II-B is generally lower than that of class II-A.

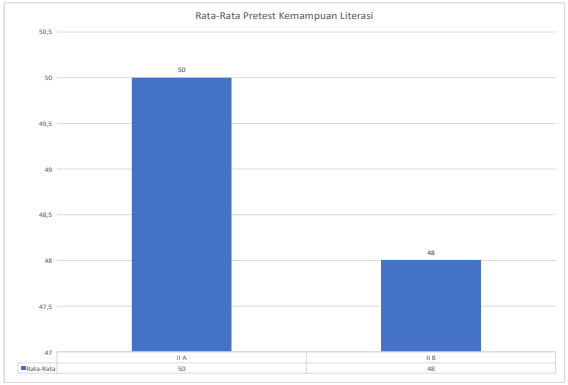

Figure 1. Histogram of early literacy skills of Flipbook media

It can be seen that the average value of class II-A is 50. This means that overall, the literacy skills of class II A students are at the basic level. Furthermore, class II-B, the average value is 48. This shows that in general, the literacy skills of class II-B students are lower than class II-A.

Table 1. Results of Flipbook Media Learning Hypothesis Testing

	Hypothesis Testing	
Instructional Media	t-count	t table
Flipbook Media	4.03	2.02

Based on the hypothesis test above, it was found that *t*count = 4.03 with a significance level of α = 0.05 and *t*table = 2.02, the hypothesis criteria were obtained *t*count = 4.03 > *t*table = 2.02. So *H*1 is accepted, this can prove that there is a significant influence of the use of Flipbook learning media on students' literacy skills.

In the pretest, the initial numeracy ability of students in class IV-B who used Dakota media showed a variation in values between 33 to 74, with an average of 50. Meanwhile, class IV-C had a pretest value range between 17 to 70, with an average of 42, the following is the histogram:

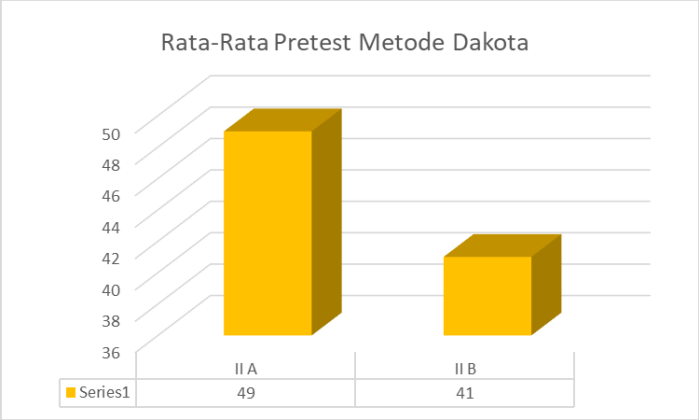

Figure 2. Histogram of Dakota media's initial Numeracy ability

Next, a posttest was conducted on the control class and the experimental class to determine the effect of using Flipbook on students' numeracy skills. The results obtained showed that the average value of class II-A was 60.5, while class II-B reached 85.5. The following is the histogram.

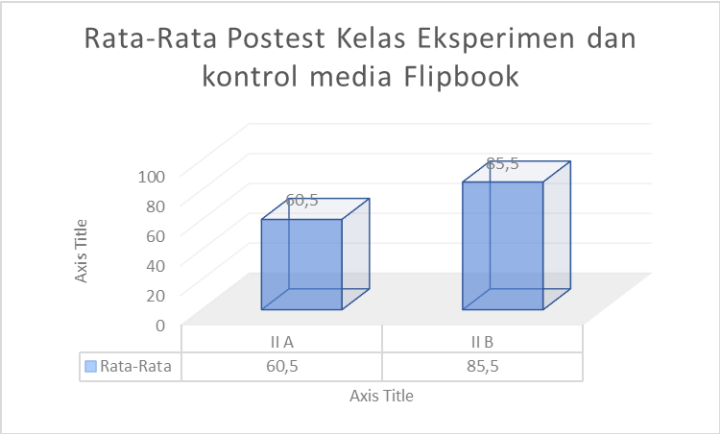

Figure 3. Histogram of final literacy skills of Flipbook media

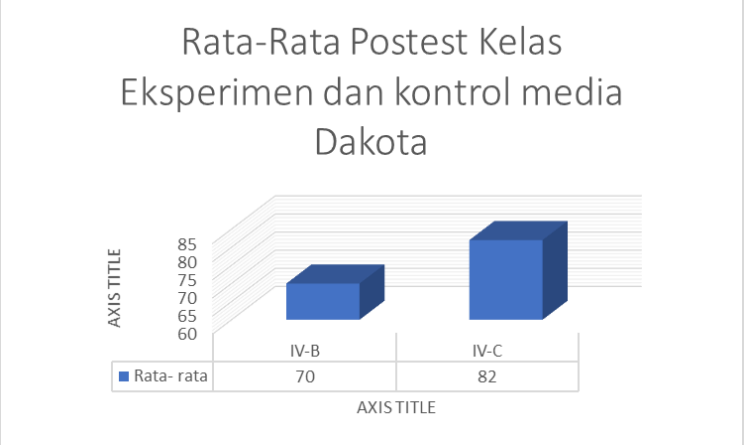

Figure 4. Dakota media final numeracy ability histogram

Table 2. Results of Dakota Media Learning Hypothesis Testing

	Hypothesis Testing	
Instructional Media	t-count	t table
Dakota Media	4.64	2.02

In learning using Dakota media, tcount = 4.64> ttable = 2.004, then H0 is rejected and H1 is accepted, it can be stated that the use of Dakota media has a significant influence on students' numeracy abilities.

In the digital era, the use of technology in learning is increasingly growing, including the use of interactive media such as Flipbook and Dakota. Research has been conducted on the effectiveness of these two media in improving literacy and numeracy skills. This literature examines various expert opinions and research results that support the use of Flipbook and Dakota in learning.

Flipbook is an interactive digital media that offers a reading experience similar to a printed book with additional interactive features. Supriyadi (2020:112-130) defines Flipbook as a digital media that allows users to flip through pages with animation and interactive navigation. Sutanto (2021:89-105) added that Flipbook simulates the experience of reading a printed book with dynamic page animation effects. Yuliana (2022:56-70) explains that digital features such as text search and multimedia in Flipbook can enhance the overall reading experience.

Previous research results also show the effectiveness of Flipbook in improving students' text comprehension. Putri (2020) found that the use of Flipbook increased students' text comprehension ability by 28% compared to conventional methods. Haryanto (2021) noted a 32% increase in text comprehension after using Flipbook. Anggraeni (2019) reported that students who used Flipbook experienced a 30% increase in text comprehension compared to students who used conventional media. In addition, Saraswati (2020) noted a similar increase of 30%, while Wijaya's (2022) research showed a significant increase in text comprehension, reaching 35% after using interactive Flipbook.

Dakota game media has also been applied in mathematics learning and has proven effective in improving students' numeracy skills. Siti Asiyah Al Siti Aisyah (2023) reported that there was an increase in students' numeracy skills through mathematics learning with Dakota game media in determining FPB in grade IV students of SDN Sisir 01 Batu.

Risnawati et al. (2019) stated that the use of Dakota Mathematics media has a positive impact on student learning outcomes, especially in the concepts of FPB and KPK. This is reinforced by the findings of Rauf R. et al. (2021), which showed a significant influence of the use of Dakota media in mathematics learning in grade IV. In addition, Malo YA (2023) revealed that the Congklak Musi KPK and FPB teaching aids have been applied in mathematics learning at SMP Negeri Satap Padadita in the Kampus Mengajar 4 program. The use of these teaching aids has been proven to increase student motivation in participating in numeracy learning and help them in solving questions related to FPB and KPK.

Based on various expert opinions and previous research results, Flipbook and Dakota have proven effective in improving students' literacy and numeracy skills. Flipbook as an interactive digital media can improve text comprehension through a more engaging reading experience, while Dakota as a game media can help students understand mathematical concepts better through a more enjoyable approach. Thus, the integration of these two media in learning management can be an effective strategy in improving student learning outcomes.

CONCLUSIONS AND RECOMMENDATIONS

This research is entitled Flipbook and Dakota Media-Based Learning Management in Improving Student Literacy and Numeracy in Elementary Schools. Based on the results of the study, it can be concluded as follows:

1. Flipbook Media-Based Learning Management has been proven to improve student literacy at SD Negeri 060938 Medan Johor. This can be seen from the increase in the average literacy ability of students, from 48 to 85.5.
2. Dakota Media-Based Learning Management is able to improve students' numeracy skills at SDN 064960 Medan Polonia. The average student numeracy skills increased from 42 to 82.
3. The results of the hypothesis test show that the use of Flipbook media has a significant effect on improving student literacy. The t-count value (4.0346) is greater than the t-table (2.0243), so H_0 is rejected and H_1 is accepted. Likewise, the use of Dakota media has a significant impact on improving student numeracy, with the t-count (4.64) greater than the t-table (2.004), so H_0 is rejected and H_1 is accepted.

ADVANCED RESEARCH

Building on the findings of the study entitled "*Flipbook and Dakota Media-Based Learning Management in Improving Student Literacy and Numeracy in Elementary Schools,*" future research can explore the long-term impact and scalability of these digital learning tools in diverse educational settings. Given the significant improvement in literacy and numeracy skills—evident from the increase in average scores at SD Negeri 060938 Medan Johor (from 48 to 85.5) and SDN 064960 Medan Polonia (from 42 to 82)—further investigation is warranted into the underlying cognitive mechanisms driving these enhancements. Additionally, comparative studies could examine the effectiveness of Flipbook and Dakota media against traditional teaching methods across different age groups and subjects. Experimental designs incorporating larger sample sizes and varied socio-economic backgrounds would provide deeper insights into the generalizability of the results. Moreover, qualitative approaches, including student and teacher feedback, could enrich understanding of user engagement and pedagogical adaptability. These future directions would not only validate the efficacy of media-based learning management but also contribute to the strategic integration of digital tools in modern education systems.

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