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Implementation of Ebook-Based Serial Image Media to Improve Science Learning Outcomes of Second Grade Elementary Students

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Abstract

The poor performance of second-grade science pupils at SD Negeri 4 Berbek prompted this research. The failure to employ creative forms of educational media that can pique students' interest and deepen their comprehension contributes to subpar learning outcomes. The primary goal of this research is to examine the efficacy of ebooks as a serialized visual medium for scientific education. Two cycles of classroom action research (PTK) were employed as the research approach. A total of 25 second-grade students from SD Negeri 4 Berbek served as research subjects. The background of this study highlights that conventional teaching media are often ineffective due to their inability to engage students actively and cater to diverse learning styles. Research indicates that traditional methods may lead to passive learning, resulting in lower retention and understanding of scientific concepts. Evidence suggests that second graders at SD Negeri 4 Berbek had average learning outcomes that were far lower than the national norm, highlighting the need for new strategies. Interviews, observations, and tests measuring learning outcomes were used to gather data. The findings demonstrated that students' scientific learning outcomes may be enhanced by the utilization of serialized graphic media based on ebooks. Students 'average scores rose from 63.2 (before implementation) to 75.4 (after), and 72% of them were able to finish the first cycle. The average score rose to 84.8 in cycle II, and 92% of the learning was retained. Students also showed increased engagement and excitement as they learned. The results of this study show that second graders at SD Negeri 4 Berbek can improve their academic learning outcomes by using ebooks as a serialized visual medium.

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INTRODUCTION

Science learning in elementary schools has an important role in shaping students' knowledge base and interest in science (Handono, Fitrotun Nisa, Prihatni, & Negeri Jetak, 2023). Through science learning, students are introduced to basic science concepts that are relevant to everyday life, such as an introduction to living things, the environment, and natural phenomena. Although science learning has great potential to attract students' interest, the science learning process often faces challenges.

Challenges that are often faced in the science learning process, such as low student interest and learning outcomes (Wahyuni & Sayekti, 2023). Based on the results of observations, one of the causes of the lack of student learning outcomes at SD Negeri 4 Berbek is the lack of use of varied media and innovative learning methods, such as serialized image media. This is in accordance with the opinion of (Juniawan et al., 2023; Sasmitha et al, 2023; Ramdani et al, 2023;

Widodo, Indraswati, & Royana, 2020), asserting that students' engagement with and enthusiasm for learning may be enhanced by the utilization of various learning media. According to (Wibowo et al, 2020; Arsyad, 2017: 114) Serial picture media is a tool to attract students' attention in participating in learning activities and help students understand science concepts better.

The ebook-based serialized image media is one of the alternatives that can be used to improve student learning outcomes (Dwitia, 2022). In research conducted by (Ndoluanak et al., 2022; Rifqiani, Andjariani, & Dewi, 2024), it was found that the use of image media in science learning had a positive effect on student interest in learning. Another study by Safitri & Kabiba, 2020; Scientific & Education (2024), and Hasyim (2024) concluded that image media helps students connect abstract concepts with the real world, so they more easily understand the material. However, research that specifically examines the effectiveness of ebook-based serialized image media in learning science in grade II elementary schools is still limited. The uniqueness of this study lies in the integration of serialized image media with an ebook platform, which is expected to provide a more interactive and interesting learning experience for students.

The main purpose of this study was to find out whether using ebooks as a serialized graphic medium can help second-graders learn more about science. In addition, the purpose of this study was to determine what helps and what hinders the use of media in SD Negeri 4 Berbek. The goal is to draw conclusions about how to improve learning in the future based on the constraints and supporting variables considered.

The urgency of this research is based on the need to improve the quality of natural science learning in elementary schools, particularly at SD Negeri 4 Berbek, which continues to face challenges in achieving optimal learning outcomes. This study is unique in its integration of serial image media with an ebook platform, as this approach offers several advantages over traditional printed media. Ebook-based serial image media can provide interactive and dynamic content that captures students' attention more effectively than static images in textbooks. Additionally, the multimedia capabilities of ebooks, such as animations, audio, and hyperlinks, cater to various learning styles and enhance comprehension. The hope is that the results of this study can serve as a guide for educators in applying innovative learning media that align with technological advancements and the characteristics of today's students. Furthermore, this research holds significant value in providing empirical evidence of the effectiveness of ebook-based serialized image media in increasing students' interest and understanding of science learning materials.

METHODS

The event that took place on April 30, 2023, was an action research project in the classroom at SD Negeri 4 Berbek in the Berbek District of Nganjuk. This study's population included twenty-five second graders from SD Negeri 4 Berbek. These 25 students represent the entire population of second-grade students at the school, as there are no additional students in that grade level. Therefore, there was no need to use a larger sample, as the entire population was included in the study. This approach allows for a comprehensive analysis of the learning outcomes specific to this group, ensuring that the findings are directly applicable to all second-grade students at SD Negeri 4 Berbek. This group is considered representative and relevant to the research objectives, namely improving science learning outcomes by using ebook-based media.

Assessment of student learning outcomes, observation sheets, interviews, and documentation were used as data collection approaches in this study. At the end of each cycle, students take an exam designed to measure how well they learn science content. Students ' progress towards scientific learning goals each cycle is tracked using observation sheets. Student perspectives and adjustments to the use of visual media serialized with ebooks for learning were investigated through interviews to collect qualitative data. To supervise how actively and seriously

children study, documentation is used. Planning, implementation, observation, and reflection are the four stages that make up the two cycles of Kemmis and Taggart's research process.

1. Planning
   Planning is an action plan that is carried out to achieve the desired goals. At this stage, the preparation of learning devices includes making ebook-based serialized image media, making lesson plans, and making research instruments (tests, observation sheets, and interviews).
2. Acting
   Implementation involves conducting face-to-face learning activities in the classroom. At this stage, the class used is class II SD Negeri 4 Berbek. The activities carried out at this stage are: (1) The teacher greets students with greetings. (2) Presence. (3)Apperception. (4) The teacher was asked to prepare an ebook type of serialized picture media to teach science material. Learning takes place with an interactive approach to increase student attention and engagement. (5)Explaining the tasks that students must do and distributing student worksheets that have been prepared. (6)Students who have completed the task are then interviewed about the use of serial image media for science subjects that have been tested.
3. Observing
   Observation is observing the results and consequences of the actions taken on students. Students' activities and efforts during the learning process are observed, and data on their responses to the use of learning media are collected. In addition, this stage is carried out to determine whether the actions taken are in accordance with the plan that has been prepared.
4. Reflecting
   Reflection is an activity that includes analysis and evaluation of the actions taken by students. At the reflection stage, the researcher analyzes the results of observations, tests, and interviews from the data that has been collected. To find effective solutions that will be followed up on in the next cycle.

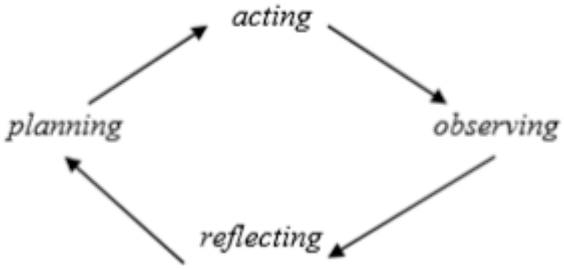


Figure 1. The Kemmis and Taggart Action Research Model Cycle

Data analysis using quantitative descriptions based on the average total percentage. The performance indicator in this study is whether the average student score is equal to or more than the KKM of 75 or reaches the target completeness of 70%. Student completeness can be measured through their learning achievement criteria. Calculating classical learning success can be done with the following formula:

$$\text{Percentage of completeness} = \frac{Number\ of\ students\ who\ are\ complete}{Total\ number\ of\ students} \text{ x } 100$$

Table 1. Categories of Student Learning Outcomes

Score	Category
80 ≤ x ≤ 100	Very Good
65 ≤ x ≤ 79,99	Good
55 ≤ x ≤ 64,99	Fair
40 ≤ x ≤ 54,99	Less
0 ≤ x ≤ 39,9	Very Poor

Source: (Amral, 2023)

RESULTS AND DISCUSSION

Students in SD Negeri 4 Berbek's second-grade class were able to increase their science knowledge through the use of ebooks and serialized image media, according to this research. The planning, doing, watching, and reflecting phases make up each cycle. Within a span of two weeks, each cycle is completed.

Table 2. Post-Test and Pre-Test Results of Cycle I and Cycle II

Category	Cycle I	Cycle II
Average score	75,4	84,8
Highest score	85	90
Lowest score	50	60
Number of students who reached KKM	18	23
Number of students who did not reach KKM	7	2
The percentage of students who completed	72%	92%
The percentage of students who did not complete	28%	8%

The observation results in Cycle I showed that the average student score increased from 63.2 (before the action) to 75.4, with a percentage of learning completeness of 72%. However, 7 students did not reach the Minimum Completeness Criteria (KKM), indicating the need for further improvement. Based on the reflection of Cycle I, Cycle II was implemented to enhance the learning outcomes of those students who had not yet met the KKM.

In Cycle II, the average student score increased again to 84.8, with learning completeness reaching 92%. Additionally, observations indicated a notable increase in student activeness and participation during the learning process. Cycle II was considered to have achieved the target of completeness and provided maximum results, so there was no need to take action in the next cycle.

This finding is in line with research conducted by Prasetyo (2018), Utami (2020), and Andriani et al. (2024), that demonstrate how visual aids, such as serial killers, may enhance students' comprehension and performance in history studies classes. But this research deviates in a number of important respects. Firstly, it focuses on second-grade elementary students, whereas the previous studies primarily targeted higher educational levels. Additionally, the characteristics of the students in this study, including their developmental stage and learning needs, are distinct from those in the earlier research.

Moreover, this study specifically implements ebook-based serial image media, which combines traditional visual aids with digital technology, enhancing interactivity and engagement. This approach allows for a more dynamic learning experience, as proper visualization helps students build clearer mental representations of the concepts taught. By facilitating a better understanding of the relationships between concepts, which is crucial in complex learning, this study demonstrates that the application of visual media in learning can have a significant positive impact on student learning outcomes, particularly for younger learners.

In addition, research by Suryani et al. (2019) demonstrated that students' motivation to study Indonesian may be enhanced by the use of ebook-based technologies. Students have greater freedom to learn at their own pace and in a more dynamic environment with the help of electronic books. Students can have a more engaging and enjoyable learning experience when they utilize ebooks with serialized visuals for science. In addition to disseminating knowledge, technology may pique students' interests and encourage them to actively participate in class.

However, this research makes a new contribution in the context of science learning, especially in grade II elementary school, which has not been studied in depth. Research by (Murtinem, 2020; Nassa, 2021; Mayer (2009) Evidence from primary schools suggests that visual media can help children retain more information, particularly when it comes to science topics that might be challenging for younger pupils to understand. Teachers may create a more engaging

and productive learning environment by combining visual media with current technology, such as ebooks and applications based on augmented reality. In addition to helping kids retain more information, this method also inspires them to use their critical and creative thinking skills when confronted with obstacles to their learning.

Based on these findings, teachers are advised to use technology-based media, such as e-books, that are integrated with learning materials more often. In addition, it is necessary to develop similar media for other subjects, so that the benefits can be felt more widely. The research conducted is almost similar to research from (Suparman et al., 2020) significant differences in influence regarding science learning outcomes between experimental classes treated with image media and control classes that were not treated with image media.

This study has several limitations, including: (1)The research subject only involved one class with a limited number of students (25 students), so generalization of the results to a wider population needs to be done carefully. (2)The research was only conducted for two cycles, so the long-term effects of the application of this media cannot be known. (3)Not all students have the same level of skill in using the ebook, so adaptation time is needed.

CONCLUSION

The purpose of this research is to determine if second graders at SD Negeri 4 Berbek may benefit from using serialized image media based on ebooks to enhance their science learning outcomes. There was a statistically significant improvement in both average scores and learning completion throughout both cycles, suggesting that this medium is useful for improving students' learning outcomes. More specifically, students were far more involved and engaged in the learning process.

However, it is important to acknowledge the limitations of this study. The sample size was limited to 25 students, which may affect the generalizability of the findings. Additionally, external factors, such as classroom dynamics and varying levels of prior knowledge among students, could have influenced the results. Methodological limitations, including the reliance on specific assessment tools, should also be considered when interpreting the outcomes.

While the findings demonstrate the effectiveness of ebook-based serialized picture media, the broader implications suggest that this approach could be applicable in various educational contexts and potentially adapted for other grade levels. Future research could explore the long-term effectiveness of this media, as well as comparisons with other instructional methods to further validate its impact on student learning. By addressing these areas, educators can better understand how to implement innovative teaching strategies that enhance learning outcomes across diverse settings.

Based on the conclusions, the researchers offer the following specific suggestions:

1. Integration of Ebook-Based Serial Image Media: Teachers should adopt effective strategies to integrate ebook-based serial image media into science learning. This could include using interactive features of the ebooks to facilitate discussions, incorporating multimedia elements to illustrate complex concepts, and designing activities that encourage collaborative learning among students. For instance, teachers can create group projects where students use the ebook to research a topic and present their findings using the serialized images, fostering both engagement and comprehension. Supporting literature, such as Mayer's Cognitive Theory of Multimedia Learning, emphasizes the importance of combining visual and textual information to enhance understanding (Mayer, 2009).
2. Provision of Supporting Facilities: Schools should invest in necessary technological devices, such as tablets or interactive whiteboards, to facilitate the use of ebook-based media. Additionally, professional development programs should be established to train teachers in the effective creation and utilization of ebook-based resources. Training could focus on digital literacy, instructional design, and strategies for integrating technology into the

curriculum, ensuring that teachers are well-equipped to implement these innovative learning tools effectively.

3. Future Research Directions: Further research should involve a larger sample size and an extended duration to assess the long-term effects of ebook-based serial image media on student learning outcomes. A recommended methodology could include an experimental approach with a pretest-posttest design to measure the impact of the intervention quantitatively. Alternatively, qualitative studies could be conducted to gain in-depth insights into students' experiences and responses to the media, providing a richer understanding of its effectiveness across different subjects and educational contexts.

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