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Development of Flipbook-Assisted Interactive Teaching Materials to Improve Learning Outcomes

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Abstract: SD 2 Mlati Lor Kudus has important problems in learning activities, including limited digital learning media so that student learning outcomes are relatively low, especially in science education material regarding style and its influence in everyday life. This research aims to develop products, test the effectiveness and feasibility of implementing interactive learning media for teaching materials in class IV natural education and social science subjects at SD 2 Mlati Lor Kudus-Central Java. This research applies research and development (RnD) using the ADDIE research model design. This research produced four things, including: 1) Development of flipbook-based digital teaching materials on science learning style material; 2) The students response to the interactive media flipbook-based digital teaching materials was very valid with a score percentage of 93.5%; 3) Media product feasibility test which is considered very valid by experts with an average final validation of 90%; 4) The t-test results showed SIG (2-tailed) 0.00 < 0.05, indicating an increase in the average results before and after treatment on small-scale tests and large-scale tests, so it can be concluded that flipbook-based digital teaching materials have succeeded in improving student learning outcomes in fourth grade elementary school student style material subjects (science and social studies).

Keywords: Digital Teaching Materials; Learning Media; Learning Outcomes

Introduction

Education holds an essential position in developing students' abilitiy to overcome the demands of an increasingly competitive era. Education is one way for humans to "survive" in order to adapt to the rapid development of the times. Humans in the world have the right to get a proper education. In Indonesia, the right to obtain educational eligibility is listed in Law No. 20 of 2003 which aims to improve the ability of students as human beings who believe and obey God Almighty, intelligent, creative, independent, faithful, healthy, educated, and become a responsible and democratic society. In order to achieve these educational goals, an intermediary tool is needed, namely the curriculum (Vhalery et al., 2022).

Technological developments have brought changes in the education sector, one of these changes is the transformation of technology-based teaching media to facilitate learning activities in Indonesia. The learning that currently exists in Indonesia applies an independent curriculum. The purpose of the curriculum is to improve human resources and develop educational degrees in all corners of the country. The Merdeka Curriculum in Elementary Schools, if implemented optimally, will improve the quality of learning so that educational goals can also be realized. The Independent Curriculum which focuses on meeting the importance and uniqueness of the students nature will certainly provide flexibility for students to continue to improve in the form of potential desires and abilities, especially in actualizing the independent curriculum in each school which leads to the curriculum structure (Fadhli, 2022). The impact of

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this curriculum is the innovation of the 2013 curriculum, namely the existence of IPA and IPS to IPAS. The aim of learning IPAS in the independent curriculum is to improve inquiry skills, understand oneself and one's environment by developing knowledge and concepts in learning. Science learning supports students to develop curiosity about knowledge of phenomena occurring around them (Dinda Sartika et al., 2023).

At the elementary/MI level, one of the subjects in the independent curriculum is science and technology. Science and Technology is a science that examines living things and inanimate objects in the universe and examines human life as social creatures who interact with their environment. The aim of the science and science subject is that students can integrate natural and social learning (Pendidikan, 2023).

Initial observation of the researcher and interview with Mrs. Endang Setyowati, S. Pd. (IV class teacher at SD 2 Mlati Lor) on December 07, 2023, information was obtained that the school had provided textbooks for students. However, according to the class teacher, the material presented in the textbook does not meet learning outcomes, so students have difficulty understanding the material, especially style material. Based on information obtained from observations and interviews, it is known that teachers do not fully developed learning that is integrated with technology. Teachers conduct guided learning only by physical books that are not technology-based. So there is a need for utilization and innovation to develop digital teaching materials that are opened on computers, laptops and smartphones. The background of teachers not develop flipbook-based digital teaching materials is due to lack of time, limited facilities and stuttering in using technology.

On the basis of these problems, effectiveness and efficiency in learning activities need to be considered, it is necessary to use digital-based teaching media to make it easier for teachers to deliver learning material. Learning media is a learning support facility in the educational process, so that effective educational media can create a more efficient, effective and interactive learning process because good bonds are established between teachers and students (Pendidikan, 2023). Education develops based on the demands of the times that cover various aspects of life. This transformation causes the emergence of innovation and creativity which makes it easier for individuals to carry out their activities (Anak Agung Meka Maharcika et al., 2021). Currently, learning activities need to be integrated in innovative ways, for example using electronic devices in facilitating learning objectives (Setiadi et al., 2021).

Utilizing digital-based learning media can prevent boredom in the learning activities (Sari & Ahmad, 2021). Learning media is something that needs to be applied to each learning activity, because the classroom situation will be condusive and learning activities will be more varied with learning media (Nurwidiyanti & Sari, 2022).

Therefore, learning media is needed to support students in understanding style material and to motivate students during learning, flipbook-based digital teaching materials is innovative and interesting and can arouse students' desires during the learning process. Facilities such as learning media can support the learning process to be effective and optimal. At this time the learning process is not only focused on books and blackboards, because currently there are many learning media that can be used by teachers (Fadilah et al., 2023).

Flipbook is a medium whose composition contains images, sound and writing in digital format with multimedia elements so that it attracts users to be more active (Sari & Ahmad, 2021). Flipbook is a book that can present text, images, sound, videos that are designed digitally and attractively to increase students' enthusiasm to better understand the learning process (Masithoh, 2022). According to Irawati and Sormin (2020), a flipbook is an animation composed of a number of pieces of paper to form a thick book, but the pages visualize the moving animation process. Flipbooks are innovatively designed to instill students talents and interests, which will have an effect on student learning outcomes (Erna et al., 2021). Flipbooks are generally realized based on important materials and also pay attention to the learning process in the classroom (Handayani et al., 2021).

Research innovations are found in the subject studied which focuses on natural and social science education with style material. Interactive media modules are developed in a structured manner that contains writing, sound images displayed in digital format with multimedia elements so as to make users more active (Sari & Ahmad, 2021). The media is in the form of a book that can present text, images, sound, videos that are digitally designed and attractive to increase students' enthusiasm to better understand the learning process (Masithoh, 2022). The research developed was used to test the effectiveness and feasibility of implementing interactive module for class IV students at SD 2 Mlati Lor Kudus. The author chose digital teaching materials in this research because by using a flipbook, the learning media will be more varied, not only text, images, sound and video can also be included in the flipbook media so that attracts students' attention, thereby eliminating students' boredom. The learning atmosphere in the classroom will be more interesting, communicative and interactive.

Method

Research and Development (RnD) is used in this research to process or even improve existing products (Setiawan et al., 2021). The ADDIE development model is also used as a development method used to design instructional systems with a systems approach and focuses on continuous feedback (Shaquille & Parga Zen, 2023). This model is based on a model that has been structured in a structured manner with a systematic order of activities when solving problems, mainly related to activities related to the characteristics and needs of students (Wahyudi et al., 2023).

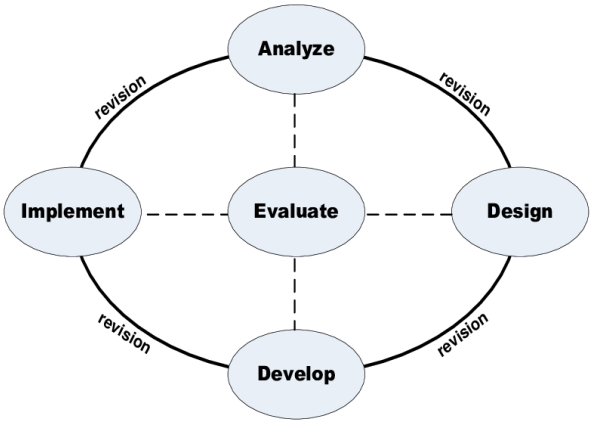

Figure 1. The ADDIE development model

Research subjects are individuals who play a role in research as data sources. Sometimes the research subject is related to the research population and sample (Pasaribu et al., 2022). A total of 24 fourth grade students at SD 2 Mlati Lor were used as research subjects. Sampling is based on certain objective or is often called a purposive sampling technique. Purposive sampling is sampling taken from selected criteria, traits or characteristics (Fauzy, 2019).

The research procedure used is to develop flipbook-based digital teaching materials, where the development assessment process becomes the main series based on teacher responses which are used as a benchmark for development success. Needs analysis is a tool for finding out what is a problem for students, what is important for students and what students need Nation and Maclister (2010) on Botifar et al (2019). In this study, researchers used a closed questionnaire with the Guttman Scale which provides alternative answers 'yes' or 'no'. The procedure for filling out the questionnaire is by ticking the appropriate answer options. Then the questionnaire is also equipped with a suggestion column so that respondents can provide supporting input for future product improvements.

Result and Discussion

Effectiveness of Flipbook-Assisted Interactive Teaching Materials

The t-test on the limited scale trial can be seen in table 1, which shown a sig value (2 tailed) 0.000 < 0.005 that Ho is rejected and Ha is accepted. Therefore, it is known that there is a difference in the average results before treatment and the results after treatment which shows the influence of increasing learning outcomes for class IV students on the use of flipbook-based digital teaching materials on style material.

Table 1. T-test Results on Limited Scale Trials

	Pair 1
	Pretest-Posttest
t	-8.748
df	5
Sig. (2-tailed)	.000

Table 2 shows the t-test results on wide-scale trials showing sig values. (2-tailed) 0.000 < 0.005 so Ho was rejected and Ha was accepted. Based on the table above, the results after treatment are higher than the results before treatment. The results after being given treatment showed an increase in scores in students after using the flipbook-based digital teaching materials.

Table 2. T-test Results on Wide-Scale Trials

	Pair 1
	Pretest-Posttest
t	-14.825
df	17
Sig. (2-tailed)	.000

The average improvement test shows difference in results before treatment and after treatment. To calculate the average increase in the results of the value before and after treatment using the N-gain analysis technique. N-gain is the n-gain obtained through a comparison of the difference in scores before and after treatment using SMI and before treatment. N-Gain is the average increase in student learning outcomes on the material Style and Its Influence in Life using the flipbook-based digital teaching materials.

Table 3. N-gain Test Results on Limited Scale Trials

	N	Min	Max	Mean	Std. Deviation
Ngain_Score	6	.57	.92	.7728	.11457
Ngain_Percent	6	57.12	91.66	77.2804	11.45700
Valid N (listwise)	6				

The results of the average increase test (N-gain) in a limited-scale trial, it is known that the data has an average increase of 0.77 which is classified as moderate criteria.

Table 4. N-Gain Test Results on Wide-Scale Trials

	N	Min	Max	Mean	Std. Deviation
Ngain_Score	18	.60	.90	.7468	.09133
Ngain_Percent	18	59.99	89.99	74.6797	9.13290
Valid N (listwise)	18				

The results of the average increase test (N-gain) in a wide-scale trial, it is known that the data has an average increase of 0.74 which is classified as moderate criteria.

The development of interactive teaching materials is adjusted to the results of questionnaires of student and teacher needs and is developed according to the learning objectives listed in the independent curriculum and adapted to students. Researchers use the ADDIE development model developed by Dick and Carry (1996) on Sugiyono (2019) the ADDIE model has 5 stages which are shown in Table 5.

Table 5. ADDIE Stages

ADDIE Stages	Information
Analysis	Researchers carry out problem and needs analysis activities. The activities carried out are in the form of observations of the learning process and teaching materials in the classroom.
Design	Researchers carry out activities to formulate learning objectives, plan material that becomes problem points, and design teaching materials according to needs.
Development	Researchers prepare summarized material for the learning process
Implementation	Researchers imply development products for use in the learnig process.
Evaluation	Researchers use formative tests to test improvements in learning outcomes

This research produces flipbook-based digital teaching materials designed with the help of website https://www.canva.com to make the appearance of the teaching materials more contemporary and attractive according to the characteristics of students. Flipbook displays are varied, not fixated on texts, even images, sounds, texts and videos can be displayed on flipbook media then the learning activities feel meaningful Ramdania (2016) on Afliyanti et al (2023). Flipbooks designed through advanced software produce PDF (Portable Document Format) file outputs and then convert them into flipbooks (Afriadi et al., 2023). flipbook-based digital teaching materials in the form of product output in HTML (Hypertext Markup Language) format using the https://heyzine.com/ website so that the resulting flipbook-based digital teaching materials can be accessed like a digital book that can be turned back and forth. Learning media can be accessed through the https://heyzine.com/flip-book/3242f01d8f.html link. The results of flipbook-based digital teaching materials are shown in the following image.

Figure 2. Title Page

Figure 3. Main Menu

Figure 4. Teaching Materials Usage Guide

Figure 5. Learning Objectives

Figure 6. Learning Materials

Figure 7. Evaluation

Figure 8. Online Games

Figure 9. Glossary

Figure 10. Developer Profile

Figure 11. Supervisor Profile

Feasibility Assessment Result of Flipbook-Based Teaching Materials

The media feasibility of flipbook-based interactive teaching materials media is carried out through validity tests from material experts and media experts. The expert validator of material in the flipbook-based digital teaching materials is Mrs. Dewi Nilam Tyas, S. Pd., M.

Pd. a material expert as well as lecturer in the Department of Elementary School Teacher Education with essential science expertise. The media expert is Mr. Abtadi Tris Hamdani, M. Pd. a lecturer in the Department of Elementary School Teacher Education.

Table 6. Percentage of Material Expert Validation Results

Assessed Aspect	Assessed Aspect Indicators	Score Obtained
Content Eligibility	a. Completeness of Material	11
	b. Breadth of Material	10
	c. Accuracy of the Material	18
Language	a. Language Rules	8
	b. Use of Language	18
Evaluation	Material Evaluation	6
Sum		71
Percentage (%)		88.75%
Criterion		Qualified

Table 7. Percentage of Media Expert Validation Results

Assessed Aspect	Assessed Aspect Indicators	Score Obtained
Display	a.Media Design	27
	b. Layout	16
	c.Design Appeal	7
Operation	Operation of Learning Media	11
Up-to-date Accuracy and Clarity	Accuracy and Clarity of Learning Media	12
Sum		73
Percentage (%)		91.25%
Criterion		Qualified

Table 10 shows the indicators tested and the validation scores of material experts on style material. In the table, the material expert wrote a score of 88.75% namely the criteria for being worthy of improvement or revision. Table 11 shows the aspects tested and media expert validation scores for flipbook-based digital teaching materials. From this process achieved a percentage score of 91.25% and was classified as appropriate criteria for improvement or revision.

By focusing on the possibilities and obstacles faced in learning in class IV of SD 2 Mlati Lor. Through interviews and observations conducted to collect data, it was found that students were less interested in studying material because the presentation of the material was considered uninteresting and tended to be boring. The learning methods used are still not effective, which causes students' interest and motivation to learn to remain low and students' active attitudes in the learning process have not yet developed. Supporting facilities for learning activities are less interesting and less varied. This makes students feel bored and ultimately become passive in the learning activities. Based on research results of Nurwidiyanti and Sari (2022) argue that the implementation of learning media in learning activities, because it encourages students to master the learning delivered by the teacher so that learning activities will run conducively. One application that supports learning media, especially digital-based ones, is the flipbook. Erna, et al (2021) concluded that flipbooks are prepared with innovation to increase student potential, so as to have an effect on students learning outcomes.

The data collection process in the study was obtained based on observation, interwiews, and filling out questionnaires on the needs of students and teachers. The feasibility of flipbook-based digital teaching materials was obtained through a validation questionnaire of material experts and media experts. Data on student responses to student worksheet media on science and social content style material was obtained through a qualitative questionnaire. Data on increasing student learning outcomes when using digital flipbook material style media was obtained through evaluation before media use and after media use which was analyzed quantitatively with normality tests, t tests, and n-gain tests using the SPSS 26 application.

Based on the research objectives in collecting data, the researchers carried out small-scale trial activities in two stages with a total of 6 objects and large-scale trial activities with a total of 18 objects. In this small-scale trial activity, the research subjects were 6 grade IV students at SD 2 Mlati Lor. This small scale trial begins with the activity of working on pretest questions first, then continues with conducting trials on the flipbook-based digital teaching materials that has been developed in science learning activities, then continues with giving student response questionnaires to the learning activities that have been implemented and closes with activities learning evaluation. Learning using the flipbook-based digital teaching materials uses a scientific approach. Learning activities begin with literacy through the flipbook-based digital teaching materials first, then continue with the teacher's presentation of the material to students, then students are given an evaluation. Based on the activities that the researchers analyzed, it showed that the six students had achieved the KKTP. The results of the analysis are shown in the N-Gain table. The data showed an average increase of 0.55, which is included in the medium criteria.

In this large-scale trial, the research subjects were 18 class IV students at SD 2 Mlati Lor. Flipbook-based digital teaching materials have massively succeeded in improving learning outcomes. The results of the student responses were obtained from the results of small-scale

trials and large-scale trials, then analyzed using mathematical calculations to find the average of the questionnaire results. In the limited trial the student response to the questionnaire showed an average of 94%, after distributing the questionnaire the student response in the large scale trial increased to 96% so that in the final result the average student response was 95% which was included in the very good category. After conducting research using worksheets, students can provide effectiveness in classroom learning activities, especially elementary school students (Edwar et al., 2021). N-Gain test on large-scale trial activities, the average shows 0.77, which means it is included in the medium criteria.

Conclusion

This research has developed learning media for the flipbook-based digital teaching materials on style material for science and social studies content. The material expert validity test showed 88.75% and the media expert validity test was 91.25%, which is classified as very valid so that flipbook-based digital teaching materials is suitable for use. Apart from that, the teacher and student give assessments through questionnaire eith an average of 96% which is classified as very good, this shows that respondents optimally actualize learning activities using the flipbook assisted interactive teaching materials. The flipbook assisted interactive teaching materials is effectively used to support learning activities in improving learning outcomes through cognitive science lesson content about Style and its Influence on Life.

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Author Contributions
This research contributes to improving the quality of education through products developed especially for schools that are the subject of research. Researchers also hope that the results of this research will be useful for other educational units so that they can be implemented as study material or references for further or similar research.

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