Development of Digital Pop-up Book Media to Increase Interest and Learning Outcomes on Water Cycle Material

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Abstract: Science, which studies living beings and inanimate objects in the universe, requires engaging learning media to foster students' interest in learning. A problem was identified at SDN Ngaliyan 05, where the lack of varied learning media and the monotonous use of textbooks resulted in low interest and incomplete learning achievement related to the water cycle material, as per KKTP standards. This study aims to develop, analyze the validity, and assess the effectiveness of digital Pop-up Book media to enhance interest and learning outcomes in the water cycle material for fifth-grade students. The research method used is research and Development (R&D) with the ADDIE model. The results show that digital Pop-up Book media is highly feasible, with validation scores of 87.5% from material experts, 97.5% from media experts, and 97.5% from practitioners. The media effectively increases interest and learning results as determined by t-test analysis, with a sig. (2-tailed) value of $0.000 < 0.05$. The N-gain test result shows a moderate improvement in learning interest 0.63 and learning outcomes 0.67. In conclusion, the digital Pop-up book media enhances interest and learning outcomes in the water cycle material.

Keywords: Development; Pop-up Book Digital; Learning Interest; Learning Outcomes.

Introduction

Education is a conscious human effort to gain knowledge that can be implemented through formal or non-formal education in the transformation process to produce quality human resources [1]. Education is an effort that is carried out in a planned and deliberate manner to develop individual abilities so that through education, everyone can prepare themselves to contribute actively to social life[2]. Thus, education is one of the key elements in shaping quality generations and being able to answer challenges in the modern era [3].

The purpose of national education, stated in the fourth paragraph of the 1945 Constitution, is "To educate the nation's life" This goal illustrates the desire of the Indonesian people to commit to educating the lives of the people by providing equitable education throughout the region to ensure that every individual gets equal learning opportunities to realize a knowledgeable and competitive society Education goals will be achieved if the implemented curriculum meets the learning needs of students and is relevant to the times [4].

The education curriculum in Indonesia has been developed to implement an independent curriculum in accordance with Kegmendikhodrastek No. 56 of 2022, which contains guidelines for implementing the curriculum to support learning recovery [5]. This new curriculum is based on the principle of learning that focuses entirely on students, with the concept of Merdeka Belajar [6]. Technological developments and competency demands in the current era are some of the foundations for the development of the Merdeka Curriculum [7]. One of the

applications of using technology is the development of technology-based learning media that educators must master [8]. Learning media functions as a means to convey or distribute messages in the learning process [9].

According to Arsyad, the role of educational media is often needed in a learning process where its development is often seen today, and educational media is not only seen as an educational system but also as a learning [10]. The use of media in a lesson at the orientation stage of learning provides effectiveness in the learning process as well as the delivery of missions and messages in learning [11]. Learning media are various tools that are used to deliver messages or information in the learning process, assist teachers in teaching, and function as intermediaries between learning resources and students who receive material [8]. Learning media development must adapt to the development of information technology by getting used to designing effective and quality learning media that can positively impact student learning outcomes. [12]

Natural science is a field of science that studies living things, inanimate objects, and everything contained in the universe [13]. Based on this concept, science learning cannot be done only by nmemorizing or just passively listening to the teacher's explanation. Instead, students must be directly involved in learning through active observation and experimentation. Thus, they can develop creativity and creativity awareness in maintaining and improving natural phenomena to be able to contribute actively to maintaining a good environmental balance [14].

Based on the results of observations carried out at Ngaliyan 05 State Elementary School, various problems were found in the process of learning science in class V.

Science learning is delivered using the lecture method, which focuses on the role of the teacher as the center of learning So that student learning outcomes and interest in learning are very low. This statement is evidenced by the results of the learning interest questionnaire, which shows that 60% of students feel that the lessons given by the teacher are less fun, and 50% of students feel that the learning activities provided by the teacher make them not excited. In addition, learning media is still limited to LKS books. Schools lack learning media that can support the Science learning process, especially in Chapter 4 Get Acquainted with our Earth, Water Cycle material This condition arises because of the lack of understanding of the concept of the material taught by the teacher, which is caused by low student curiosity to solve a problem or provide an answer to the science learning sat takes place [15].

Based on the results of interviews with classroom teachers, students lack mastery of water cycle material. This is evidenced by the results of the formative evaluation scores, which show 55% of students did not complete the formative evaluation on water cycle material The results of the formulated evaluation on the water cycle material, if expressed in percentage are 15% of students have not reached the KKTP while 45% have reached the KKTP value The water cycle material is quite complex because it involves the process of particle changes that occur in the earth's atmosphere. This process cannot be observed directly by the five senses, so it can affect the effectiveness of learning [16].

Based on the problems that have been identified, researchers will look for alternative solutions by developing digital Pop-up Book media to increase interest and learning outcomes in water cycle material for fifth-grade students of F SDN Ngaliyan 05. Digital Pop-Up Book media development is able to present a learning experience that is more fun and interactive and involves student activeness.

Pop-Up Book media is a tool used by teachers to deliver learning materials. Each page has elements that can appear interactively, creating a surprise effect with an attractive color display and a design resembling a two-dimensional shape. This media can increase student interest in learning [17]. Pop-Up Book Digital learning media is a book that displays images that can stand upright, thus forming interesting visual objects. This media design combines visual-based three-dimensional elements, creating an amazing impression [18]. The development of Pop-Up Book Digital media aims to assist students in learning the material presented in lightly [19].

This study is supported by the results of research showing the high enthusiasm and enthusiasm of students when using Pop Up Book Digital media, which indicates the effectiveness of the media in the learning process [20]. Pop-Up Book media has been proven to be able to improve the cognitive abilities of fifth-grade elementary school students as well as broaden their horizons and generate enthusiasm for learning [21]. Pop-Up Book Digital Media is an effective learning tool that is effective, interesting, and relevant to developments in the era of revolution 4.0 [22]. Pop-Up Book Digital can be an efficient option to help teachers improve the quality of learning in elementary schools while highlighting the importance of using technology in education [23].

Based on the problems that have been found and supported by several relevant studies, the formulation of the problem is how the design of Digital Pop-Up Book media, the level of feasibility of Digital Pop-Up Book media and how its effectiveness in increasing learning interest and learning outcomes on water cycle material for fifth-grade students of Ngaliyan 05 State Elementary School. This research was conducted because interactive learning media is increasingly needed in today's digital era. Digital Pop-up Book, as an innovation in learning, has the potential to attract student interest and support a more effective learning process, so it is hoped that the development of this media can encourage students to be more active and motivated in understanding water cycle material. Water cycle material is quite complex [16]. It requires a good understanding, and the right learning media design can help students understand this concept through attractive pop-up book visuals. The development of this media is also an innovation in creating media that is informative and fun and can be an example for the development of other learning media. This study aims to develop a design and analyze the validity level and effectiveness of Digital Pop-Up Book media to increase learning interest and learning outcomes on water cycle material.

Research Methods

Researchers apply the Research & Development research and development method in developing Digital Pop-Up Book media. Research & Development (R&D) research is carried out as an effort to implement new ideas or complement existing creation products to make them more optimal [24]. his study aims to analyze the process of developing Digital Pop-Up Book media to increase interest and learning outcomes on water cycle material in class V of Ngaliyan 05 State Elementary School

This research was conducted at SDN Ngaliyan 05, Semarang City, in the odd semester of the 2024/2025 school year, involving 20 students as participants. This study used a purposive sampling method with 20 students with different variations of learning abilities, namely low, medium and high. This research and development applied the ADDIE model, which consists of five stages tailored to the needs and objectives of the research The ADDIE research model includes five main stages as follows: (1) Analysis, (2) Design, (3) Development, (4) Implementation, (5) Evaluation [25].

Data collection methods in developing Pop-Up Book Digital media are carried out through test and non-test techniques. The test technique can be done through pretest and posttest, which aims to test students' cognitive abilities and compare learning outcomes before and after using learning media. This non-test technique is used for a questionnaire of interest in learning before and after using learning media and analyzing the needs of teachers and students, validating the feasibility of media by experts, as well as teacher and student responses regarding the media that has been developed.

The data analysis technique used in this research is a quantitative data analysis technique consisting of product data analysis techniques, preliminary data analysis techniques, and final data analysis techniques. The data analysis method includes the evaluation of media feasibility by media experts, material experts, and practitioners. The

initial and final data analysis uses statistical analysis with a normality test, T-test, and N-gain test

Results and Discussion

The development of this Digital Pop-Up Book media was obtained after the researcher conducted all stages in accordance with the research steps determined by the researcher, which consisted of 5 stages. The ADDIE research model includes five main stages. (1) Analysis, (2) Design, (3) Development, (4) Implementation, (5) Evaluation [25].

Analysis

The problem analysis used to identify problems involves data collection methods, such as distributing questionnaires to teachers and students, conducting interviews with teachers, and observing the teaching process in the classroom.

The results of interviews with the fifth-grade teacher and learning observations show that in the IPAS learning process, most students still have not completed the KKM score on water cycle material. In the learning process of this material, the teacher applies the lecture method. Discussions and presentations that are tailored to the learning objectives. The learning media used only relies on books and projectors, so students easily feel bored when paying attention to the material. In the learning process, the use of appropriate methods, media and models is very important so that the material can be conveyed and easily understood by students [26].

The analysis stage of distributing teacher and student needs questionnaires aims to identify learning media needs and understand the types of media teachers need to support the learning process. In addition, researchers know the media that are in accordance with students' characteristics and learning needs. The results of the distribution of student needs questionnaires show that students still often have difficulty in learning IPAS. Students feel that teachers rarely provide learning media in accordance with the material being taught. The results of the distribution of the teacher need questionnaire show that teachers rarely provide media due to difficulties in making interactive learning media and a lack of knowledge about variations in learning media. Therefore, this research develops interactive learning media to make it easier for students to understand the material and create a fun learning   The learning media developed is a digital F Book media that is easily accessible with gadgets or laptops Digital Pop-Up Book media has good durability, does not require a lot of storage space, and is safe from the risk of spreading computer viruses. In addition, the advantage of this media is the presence of elements that help students understand the material about the water cycle. This media is also complete with examples around and quizzes.

Design

The design stage begins with the design of making and compiling the digital Pop Up Book media structure framework. At this stage, the process includes selecting the background design, media display, main menu, related symbols, animation, and background music to be used. The design chosen must align with the objectives of media development and its content.

In the second step, the outline of the learning media structure that has been compiled is put into the Pop Up Book format using PowerPoint. The third step in this stage is to determine the systematic presentation of content material In this step, the process includes determining learning outcomes, learning objectives, indicators of success of learning objectives, subject matter, evaluation, author profile, and instructions for use. The fourth step is closely related to the previous step, especially in preparing the material in the media. The material used in the media uses water cycle material with details of the material, namely the definition of the water cycle, the stages of the water cycle, the kinds of water cycles and efforts to maintain water availability. The fifth step relates to the initial form or design of the digital pop-up book media, which consists of several parts. The parts of the section can be seen in Figure 1.
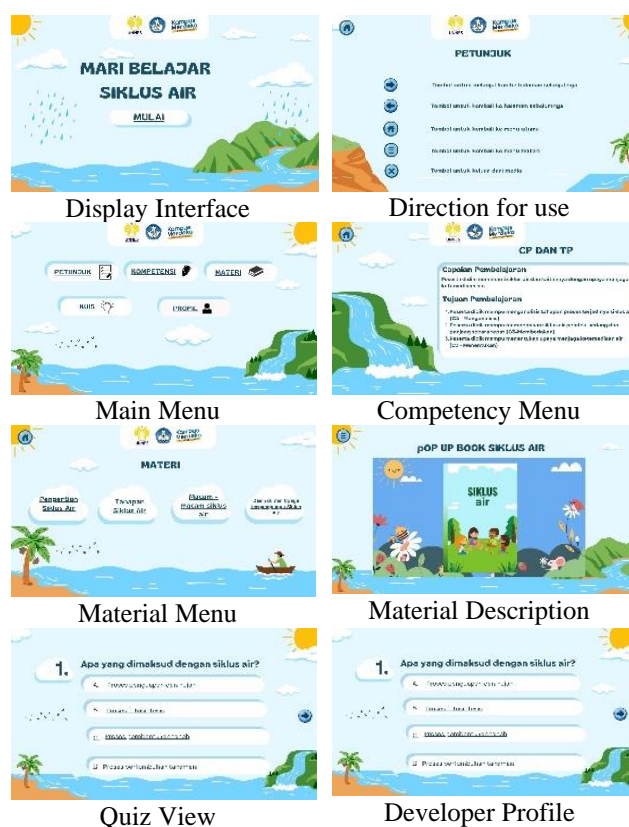
Display Interface	Direction for use
Main Menu	Competency Menu
Material Menu	Material Description
Quiz View	Developer Profile

Figure 1. Initial Media Design

The advantages of this media are that the interactive design and attractive visuals can arouse students' interest in learning. Animations and elements are adapted to the water cycle material, which easily helps students thoroughly understand complex concepts. Second, the pop-up book has a quiz feature that allows students to practice and actively test their understanding. The quiz feature can help students recognize which parts of the material need to be studied again. Third, this media can be accessed independently outside of class hours, thus allowing students to deepen the material at home to increase their understanding of the water cycle material. Thus, the attractive design, interaction, and flexibility combination can make Pop-up Book an effective medium in increasing learning interest and learning outcomes on water cycle material.

Development

Development begins with the validation of digital pop-up book media products. This product validation aims to assess the feasibility and quality of digital pop-up book media. The results of validation by experts are used to improve the shortcomings found and for small-scale tests The validation instrument uses a four-level Likert scale to measure the level of product suitability with predetermined standards. Validation data analysis was carried out by calculating the average percentage of scores obtained. The results of the experts' validation show that the product has a high feasibility level. The validation results by learning media experts obtained a score of 97.5%, validation by material experts obtained a score of 87.5%, and practitioner experts obtained a score of 97.5%. Based on the rating scale, the three results are categorized as very feasible, indicating that the product met the quality standards.

Table 1. Expert Validation

Expert	Percentage	Category
Material	87.5%	Very Feasible
Media	97.5%	Very Feasible
Practitioner	97.5%	Very Feasible

Although the results of the validation of asteri and media experts showed a very feasible category, the media developed still received suggestions and directions for improvement to make it more optimal and ready to be tested on students. The revisions include replacing the material that was originally presented in MP4 form with hyperlinked slides to make it more interactive, the second revision is the replacement of long water cycle images to make it more appropriate, and the third revision is the addition of material on the impact of disruption of the water cycle The parts of this digital Pop Up Book media that received suggestions or input from experts for revision are listed in Figure 2.
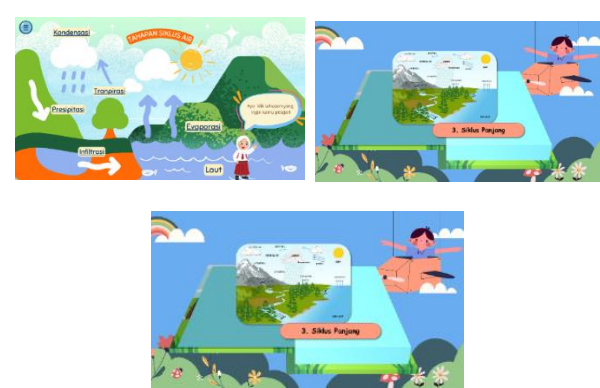

Figure 2. Revision of digital Pop-up Book Media

Suggestions and input given by material validators were media adjustments to explain the transpiration stage of the water cycle so that it is easier to understand, as well as the replacement of more appropriate long cycle images and examples of problems in the water cycle. The suggestions and input from media validators and practitioners are that the media is very feasible to use and develop.

The last step in the development stage is conducting small-scale trials to test the digital pop-up book media designed before implementation. The respondents selected

amounted to 9 students. Respondents used were fifth-grade students with different abilities. The small group test was conducted to ask for student responses based on the instruments that had been prepared. The aspects assessed in this response questionnaire include media, material, and media benefits. In addition to filling out the response questionnaire, students also filled out a learning interest questionnaire and pretest and posttest evaluation questions. The test consists of 25 multiple-choice questions for validity, reliability, difficulty level and differentiation. This aims to measure the level of student interest in the media and to determine the initial effectiveness of the media in a small-scale test; the results of the small-scale test are presented as follows.

Table 2. Small Scale Test of Learning Interest Questionnaire

Type	Score lowes	Score Highest	Percentage	Category
Before	45	60	55.11%	Less Good
After	71	100	84.5%	Very Good

The results of the learning interest questionnaire before the use of digital Pop Up Book media a percentage of 55.11%, categorized as Not Good', and after the use of digital Pop Up Book media, the learning interest questionnaire a percentage of 84.5%, categorized as 'Very Good.'

Table 3. Small Scale Test of Pretest and Posttest Question

Test Type	Lowest Score	Highest Score	Number of Past	Graduation Percentage
Pretest	44	76	4	44%
Postest	76	100	9	100%

The results of the small-scale test by 9 students obtained an average pretest score of 64.5% with a completeness percentage of 44%. The average value of the small-scale test posttest was 871, with a percentage of students who completed 100%, After conducting a small-scale test and obtaining results and feedback from students, they can carry out the implementation stage with a large-scale test.

Implementation

The implementation of digital pop-up book media was carried out at SDN Ngaliyan 05 with 20 students. This implementation was done to determine the effectiveness of using digital Pop Up Book media to increase interest and learning outcomes by filling out a learning interest questionnaire and conducting a pretest and posttest. The questionnaire on learning interests filled in by students has four aspects with five indicators per aspect; the questionnaire uses a five-level scale that has gone through the validity and reliability test stages. Furthermore, the questions students worked on for the pretest and posttest totalled 25 multiple-choice questions that went through the validity, reliability, difficulty, and differentiator tests. The results of the large-scale test are as follows (Table 4).

The results of distributing questionnaires of learning interest in large-scale tests before and after the use of digital Pop Up Book media show an increase which before the use of digital Pop Up Book media gets a percentage of 54 75%

to 84.7% after the use of digital Pop Up Book media can be categorized as Very Good.

Table 4 . Large Scale Test of Pretest and Posttest Questions

Type	Score Lowest	Score Highest	Percentage	Category
Before	35	74	54.75%	Not so good
After	68	100	84.7%	Very good

Table 5. Large Scale Test of Pretest and Posttest Questions

Test Type	Average	*KKTP*	Lowest Score	Highest Score	Percentage
pretest	37.8	70	16	76	5%
postest	80.1	70	64	92	85%

The results of the large-scale test implementation were conducted on 20 students, excluding 9 students who had participated in the small-scale trial. The average pretest result of the large-scale trial was 37.8, with 5% completeness. Meanwhile, the posttest obtained an average of 80.1 with an 85% completion percentage. 17 students achieved *KKTP*.

Evaluation

This evaluation stage carried out several statistical tests to measure the effectiveness of the developed digital pop-up book media. The instruments measured are the results of the learning interest questionnaire filled out by students who have gone through validity and reliability tests and the results of pretests and posttests done by students, which contain 25 multiple-choice questions. The questions have been tested for validity, reliability, divisibility, and difficulty level. Initial data analysis is carried out with a normality test to determine whether the data is normally distributed or not The normality test conducted by researchers used the Shapiro-Wilk test The Shapiro-Wilk

Normality Test was chosen because it is in accordance with the number of participants who are less than 50 people [27].

Table 6. Shapiro-Wilk Normality Test of Learning Interest Questionnaire

Activity	Type Inquiry	Sig Value Limit	Sig Value	Description
Small Scale Test	Before	0.05	0.166	Normally distributed
	After	0.05	0.815	Normally distributed
Large Scale Test	Before	0.05	0.260	Normally distributed
	After	0.05	0.281	Normally distributed

Table 6 shows that the significance value of all types of questionnaires of interest in learning before and after treatment in small-scale and large-scale tests exceeds the 0.05 significance limit. Hence, the data is in the normal distribution category.

Table 7 shows that the significance of all types of pretests and posttests in small and large-scale tests exceeds the 0.5 significance value limit. Hence, the data is in the normal distribution category.

The next stage of testing that needs to be done is the hypothesis test or 1-test. This test is carried out to compare averages validating the hypothesis and determining whether the hypothesis is accepted or not[28] Ho in this study, namely the development of digital Pop Up Book media does not have a significant effect on increasing interest and learning outcomes of class v water cycle material SDN Ngaliyan 05. While Ha is the development of digital pop-up book media, it significantly increases interest and learning outcomes of class v water cycle material SDN Ngaliyan 05. The following are the results of the t-test.

Table 7. Shapiro-Wilk Normality Test Pretest and Postest

Activity	Test Type	Participant	Sig Value Limit	Sig Value	Description
Small Scale Test	Pretest	9	0.05	0.139	Normally distributed
	Postest	9	0.05	0.300	Normally distributed
Large Scale Test	Pretest	20	0.05	0.196	Normally distributed
	Postest	20	0.05	0.175	Normally distributed

Table 8. T-test of Learning Interest

Type	Type Inquiry	Average Value	T-test Value	Description
Small Scale Test	Before	55.1	0	Ha accepted
	After	84.5		H0 rejected
Large Scale Test	Before	54.75	0	Ha accepted
	After	84.7		H0 rejected

Table 9. T-test of Pretest and Postest

Activity	Test Type	Participant	Average Value	Test Value	Description
Small Scale Test	Pretest	9	64.5	0	Ha accepted
	Postest	9	87.1		H0 rejected
Large Scale Test	Pretest	20	37.8	0	Ha accepted
	Postest	20	80.1		H0 rejected

We get the same significant results based on the t-test conducted on the questionnaire of interest in learning before and after treatment, as well as the pretest and posttest results. This can be seen from Table 8 and Table 9, which have

significant results for sig. 0.000. Which shows sig. (2-tailed) 0.000 0.05, it can be concluded that there is a significant difference between the questionnaire data on interest in learning before and after treatment and the pretest and

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posttest data on the learning outcomes of water cycle material. So, in this study, H0 is rejected, and Ha is accepted. So, developing digital pop-up book media significantly increases interest and learning outcomes in the water cycle material of class v SDN Ngaliyan 05. After carrying out the 1-test, the next testing stage that needs to be carried out is the N-gain test.

Table 10. N-Gain Test of Learning Interest

Activity type	N-Gain	N-Gain Percentage	Description
Small Scale Test	0.6435	64.3%	Medium
Large Scale Test	0.6320	63.2%	Medium

Table 10, the small-scale test, shows that the average results of the student interest questionnaire increased from 55.1 to 34.5 with an N-Gain of 0.6435 (64.3%). In the large-scale test, the average questionnaire results of student interest in learning also increased from 57.75 to 84.7, with an N-Gain of 0.6320 (63.2%). Both results are included in the medium category, which shows that digital pop-up book media is quite effective in increasing students' interest in learning.

Table 11. N-Gain Test of Pretest and Posttest

Activity type	N-Gain	N-Gain Percentage	Description
Small Scale Test	0.6592	65.9%	Medium
Large Scale Test	0.6759	67.5%	Medium

Table 11, the small-scale test, the average score of pretest and posttest results increased from 64.5 to 87.1 with an N-Gain of 0.6592 (65.99%), While in the large-scale test, the average pretest and posttest scores increased significantly from 37.8 to 80.1 with an N-Gain of 0.6759 (67.5%). Both test results are included in the medium category, indicating that the digital pop-up book media effectively improves students' understanding of the material. The results of Table 10 and Table 11 show that the increase in learning interest based on the learning interest questionnaire and the increase in learning outcomes based on pretest and posttest scores after treatment using digital pop-up book media are higher than before treatment using digital pop-up book media. The application of digital pop-up book media can improve learning outcomes. This has been proven in fairy tale material, which can improve students' understanding of the material [29]. The use of digital Pop Up Book media (METOPAL) in the material of recognizing the diversity of Indonesian culture can increase student enthusiasm for the teaching process so that it becomes one of the alternatives so that learning is not monton and boring [30].

The use of pop-up book media in the two studies above is based on fairy tale material and cultural diversity. In general, the three studies developed digital media as interactive learning media. Still, this study shows more significant learning outcomes because complex water cycle material is more effectively presented visually so that students more easily understand abstract concepts. Although learning outcomes have not been categorized as high, these three studies show that Pop-Up Book media effectively improves student learning outcomes. Still, the level of success varies depending on the material and media design. This study confirms that this media is effective for materials that require complex visualization, while the two studies above show its potential in contextual and narrative materials. Therefore, the development of Pop-Up Book Digital media needs to be adjusted to the material's characteristics and students' needs to achieve optimal results.

Conclusion

Based on the results of the research that has been carried out, it can be concluded that (1) researchers have designed and developed digital Pop Up Book media for water cycle material by applying the ADDIE model; (2) digital Pop Up Book media carried out feasibility testing by two experts and one practitioner, namely media experts getting a percentage of 97.5%, material experts getting a percentage of 87.5% and practitioners getting a percentage of 97.5%, (3) digital Pop Up Book media is declared effective for increasing learning interest and learning outcomes. This can be proven through the t-test results with a sig value. (2-tailed) 0.000 <0.05. The results of the learning interest questionnaire and learning outcomes in the large-scale test received N-gain test results of 0.63 and 0.67, which were categorized in moderate criteria

References

[1] A. Warisno., E. Penerapan, M. Sorogan, and K. Al, "Standar Pengelolaan Pendidikan Dalam Mencapai Tujuan Pendidikan Islam," *An Nida IAI An Nurlampung.*, vol. 1, no. 1, pp. 18–25, 2021, [Online]. Available: https://journal.an-nur.ac.id/index.php/AND/article/view/74/70

[2] I. C. Pratomo and Y. T. Herlambang, "Urgensi Keluarga dalam Pendidikan Karakter," *J. Pedagog. Pendidik. Dasar*, vol. 8, no. 1, pp. 7–15, 2021, doi: 10.17509/jppd.v8i1.31206.

[3] H. T. Elitasari, "Kontribusi Guru dalam Meningkatkan Kualitas Pendidikan Abad 21," *J. Basicedu*, vol. 6, no. 6, pp. 9508–9516, 2022, doi: 10.31004/basicedu.v6i6.4120.

[4] D. Utari and A. Muadin, "Peranan Pembelajaran Abad-21 Di Sekolah Dasar Dalam Mencapai Target Dan Tujuan Kurikulum Merdeka," *J. Pendidik. Islam Al-Ilmi*, vol. 6, no. 1, p. 116, 2023, doi: 10.32529/al-ilmi.v6i1.2493.

[5] Dian Fitra, "Kurikulum Merdeka dalam Pendidikan Modern," *J. Inov. Edukasi*, vol. 6, no. 2, pp. 149–156, 2023, doi: 10.35141/jie.v6i2.953.

[6] M. Cholilah *et al.*, "Pengembangan Kurikulum Merdeka Dalam Satuan Pendidikan Serta Implementasi Kurikulum Merdeka Pada Pembelajaran Abad 21," vol. 01, no. 02, pp. 57–66, 2023, doi: 10.58812/spp.v1.i02.

[7] M. Marisa, "Inovasi Kurikulum 'Merdeka Belajar' di Era Society 5.0," *Santhet (Jurnal sejarah, Pendidikan dan Humaniora)*, vol. 5, no. 1, p. 72, 2021, doi: 10.36526/js.v3i2.e-ISSN.

[8] F. A. Zahwa and I. Syafi'i, "Pemilihan Pengembangan Media Pembelajaran Berbasis Teknologi Informasi," *Equilib. J. Penelit. Pendidik. dan Ekon.*, vol. 19, no. 01, pp. 61–78, 2022, doi: 10.25134/equi.v19i01.3963.

[9] Ali Akbar, Abdul Wahid, Syamsul Bahri, Ahlun Ansar, and Askar Nur, "Penerapan Sistem Teknologi Pembelajaran dalam Pendidikan Nasional," *Al-Ubudiyah J. Pendidik. dan Stud. Islam*, vol. 4, no. 1, pp. 119–130, 2023, doi: 10.55623/au.v4i1.201.

[10] N. K. Masgumelar and P. S. Mustafa, "Teori Belajar Konstruktivisme dan Implikasinya dalam Pendidikan," *GHAITSA Islam. Educ. J.*, vol. 2, no. 1, pp. 49–57, 2021, [Online]. Available: https://siducat.org/index.php/ghaitsa/article/view/188

[11] A. Mukarromah and M. Andriana, "Peranan Guru dalam Mengembangkan Media Pembelajaran," *J. Sci. Educ. Res.*, vol. 1, no. 1, pp. 43–50, 2022, doi: 10.62759/jser.v1i1.7.

[12] E. Susilawati *et al.*, *Media dan Teknologi Pendidikan*. 2023.

[13] Suhelayanti, S. Z, and I. Rahmawati, *Pembelajaran Ilmu Pengetahuan Alam Sosial (IPAS)*. 2023.

[14] T. D. Harahap, R. Husein, and S. Suroyo, "Pengaruh Model Pembelajaran Contextual Teaching And Learning Terhadap Hasil Belajar Matematika Ditinjau Dari Berpikir Kritis," *J. Educ. Hum. Soc. Sci.*, vol. 3, no. 3, pp. 972–978, 2021, doi: 10.34007/jehss.v3i3.462.

[15] M. Meilindya, T. Hera, and E. Riyoko, "Hubungan Kemandirian Dan Kreativitas Siswa Terhadap Hasil Belajar Seni Rupa Kelas Iv Sd Negeri 35 Palembang," *J. PAJAR (Pendidikan dan Pengajaran)*, vol. 6, no. 5, p. 1605, 2022, doi: 10.33578/pjr.v6i5.8943.

[16] M. Dalimunthe, "Pengaruh Penggunaan Media Diorama Water Cycle (Siklus Air) terhadap Keterampilan Sains Anak Usia 5-6 tahun di TK An-Namiroh 1 Pekanbaru," 2023, [Online]. Available: https://umexpert.um.edu.my/file/publication/00013268_112478.pdf

[17] Y. F. Ningsih, N. Hariadi, I. Sugeng, A. D. kandupi, A. W. Utomo, and A. P. Bimantoro, "Pengembangan media pembelajaran pop up book digital pada pembelajaran PJOK," *J. Porkes*, vol. 6, no. 1, pp. 15–24, 2023, doi: 10.29408/porkes.v6i1.12214.

[18] A. N. Yahzunka and S. Astuti, "Pengaruh Penggunaan Media Pop Up Book Berbasis Literasi Digital terhadap Kemampuan Membaca Dongeng Siswa Sekolah Dasar," *J. Basicedu*, vol. 6, no. 5, pp. 8695–8703, 2022, doi: 10.31004/basicedu.v6i5.3909.

[19] S. Samsidar, "Pengembangan Media Pembelajaran Pop Up Book Digital Pada Materi Dongeng Untuk Siswa Kelas Iii Sd Negeri Lamreung Aceh Besar," *skripsi Progr. Sarj. Univ. Islam Negeri Ar-Raniry Darussalam Banda Aceh*, vol. 2, no. 8.5.2017, pp. 1–120, 2022, [Online]. Available: https://www.who.int/news-room/fact-sheets/detail/autism-spectrum-disorders

[20] R. A. Febriyanti and I. Sulistyawati, "Penerapan Media Pop Up Book Digital pada Pembelajaran Pendidikan Pancasila Materi Bhinneka Tunggal Ika untuk Siswa Kelas IV Sekolah Dasar," *J. Pendidik. Guru Sekol. Dasar*, vol. 1, no. 3, p. 10, 2024, [Online]. Available: https://edu.pubmedia.id/index.php/pgsd/article/view/325

[21] R. Nengsi, "Pengembangan Media Pop Up Book Untuk Meningkatkan Kemampuan Kognitif Siswa Kelas V Pada Pembelajaran Ipa Tema Lingkungan …," *J. Ilm. Mhs. Pendidik.*, vol. 1, no. 1, p. 2, 2021, [Online]. Available: https://repository.bbg.ac.id/handle/964

[22] A. Khamidah and N. Ita Sholichah, "Digital Pop Up Learning Media for Early Childhood Cognitive Development," *Indones. J. Early Child. Educ. Res.*, vol. 1, no. 1, p. 11, 2022, doi: 10.31958/ijecer.v1i1.5833.

[23] T. K. Mukhoerrunnissa, N. Nita, R. N. Rahmadina, S. N. Abibah, and R. G. Nugraha, "Pengembangan Media Pembelajaran Pop-Up Book Digital tentang Penerapan Peran Pancasila untuk Siswa Sekolah Dasar," *J. Basicedu*, vol. 8, no. 2, pp. 1634–1644, 2024, doi: 10.31004/basicedu.v8i2.7449.

[24] E. Winaryati, M. Munsarif, and Mardiana, *Cercular Model of RD&D (Model RD&D Pendidikan dan Sosial)*. 2021.

[25] Sugiyono, *Metode PENELITIAN PENDIDIKAN:(Kuantitatif,Kombinasi,R&D dan Penelitian Pendidikan)*, Edisi Keti. Bandung: ALFABETA, cv, 2021.

[26] E. N. Sitepu, "Media Pembelajaran Berbasis Digital," *Mahesa*, vol. 1, no. 1, pp. 242–248, 2021, doi: 10.34007/ppd.v1i1.195.

[27] L. Pratiwi, I. Rahayu, H. H. Mahendra, and Ri. Anggraeni, "Pemanfaatan Media Pembelajaran Countax Akuntansi Dan Pajak Mahasiswa," *J. Apl. Akunt.*, vol. 7, no. 2, pp. 407–420, 2023.

[28] T. Astuti, E. F. Ningsih, C. Choirudin, and R. Sugianto, "Eksperimentasi Model Pembelajaran Stay Two Stray (TS-TS) dan Think Pair Share (TPS) Terhadap Hasil Belajar," *J. Penelit. Tindakan Kelas*, vol. 1, no. 1, pp. 39–45, 2023, doi: 10.61650/jptk.v1i1.157.

[29] K. Nisak, Hendratno, and T. Indarti, "Digital PopUp Book Media Profile to Improve Learning Outcomes of Elementary School Students on Fairy Tale Material," *Int. J. Multicult. Multireligious Underst.*, vol. 10, no. 12, pp. 201–211, 2023, [Online]. Available: http://ijmmu.comhttp//dx.doi.org/10.18415/ijmmu.v11i1.5275

[30] B. I. Pendidikan *et al.*, "Pengembangan Mepotal (Media Pop Up Book Digital) Dalam Materi Ips Mengenal Keberagaman Budaya Indonesia," vol. 3, no. 2, pp. 72–78, 2024.