Development of Pop Up Book Media to Improve Motivation and Learning Outcomes of Natural and Social Sciences for Grade IV Elementary School

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Abstract: The lack of enthusiasm of students in participating in learning due to the limitations of teachers to make creative and interesting learning media in IPAS subjects on Indonesian cultural assets material makes learning interest and learning outcomes low. This study aims to create pop up media that illustrates Indonesian cultural assets to increase the interest and learning outcomes of fourth grade students of SD Negeri 2 Protomulyo, Kendal Regency and analyze the effectiveness and feasibility of the pop up book media developed. This research uses the 10 stages of the Borg and Gall model for R&D research. Data were collected through observation, interview, documentation, questionnaire and test techniques. The results of the media data analysis were declared very feasible by material experts and media experts with a percentage of 93%. The effectiveness of the media was tested using the N-Gain test obtained a value of 0.56 in the medium category, this value indicates that the pop up book succeeded in improving student learning outcomes, feasible and effective in improving student learning outcomes. This is evidenced by an increase in interest in learning which makes student learning outcomes increase after learning with pop up book media.

Keywords: Learning outcomes; Natural and social sciences; Pop up book

Introduction

Education is a structured effort that occurs in a learning environment to help students optimize their potential (Fauza et al., 2023). The acquisition of better knowledge, attitudes, and skills to achieve learning goals in a learning environment is called education (Al-Husseini et al., 2021; Havik et al., 2020). Curriculum updates are made so that education is getting better. In 2020, the government established the independent curriculum as the curriculum used in educational units and was implemented gradually in schools in Indonesia as a replacement for the 2013 curriculum (Manalu et al., 2022). Developing learning according to their needs is an update of the concept of the current curriculum

(Wahyuni, 2022). Independent curriculum aims to make students more active when learning (Rahmatulloh et al., 2023). So in learning, creating fun learning activities and making students active is the role of the teacher (Monteiro et al., 2021; Nadeem et al., 2023; Parker et al., 2022). Students will achieve maximum grades if the teacher processes learning activities (Bobi et al., 2023).

There are updates to the independent curriculum in elementary schools, science and social studies subjects are made one into Natural Sciences and Social Sciences or abbreviated as IPAS (Marwa et al., 2023). The science that studies the relationship between living things, inanimate objects and also relationships with social beings is also called IPAS (Isnaeni et al., 2024). Both learning when in the learning process should be made in

accordance with the teacher's policy (Nurhidayati et al., 2024). Betz et al. (2023) added, the combination of these subjects helps students understand the natural and social environment together. One of the materials in IPAS is about cultural elements. According to research conducted by Kadek Dea Krisna Putri, most students said they did not like the IPAS subject which discussed culture, history, and social problems because many of the writings were difficult to read, tended to be boring, and the material required a lot of memorization (Putri, 2024).

From research conducted in SD Negeri 2 Protomulyo through interviews, observations, and data on learning outcomes of fourth grade students of SD Negeri 2 Protomulyo, elementary school learning in social studies subjects still experience obstacles in learning, namely the lack of enthusiasm of students on cultural diversity material becomes low because according to students the material is too dense and requires a lot of memorization. From the Daily test data, especially class IV social studies of 31 students, 22 of whom have not reached the learning objectives achievement criteria (KKTP). The limitations of learning media used by teachers, namely only textbooks, pictures and the use of methods that are not varied, make the value not optimal, this is because there are no interesting concrete objects that interact directly with students. Without the use of media, teachers explain the material with teacher books and student books, making students easily bored, unable to imagine the material presented, so that students' interest in paying attention to the material decreases and results in the acquisition of learning outcomes that are not optimal. These problems are in line with research conducted by Samsudin et al. (2023) that when learning in the classroom, especially in IPAS learning, it is still conventional and teacher-centered so that there is less direct student involvement during learning. Whereas it is very important for students to actively participate in the learning process on the other hand the teacher is responsible for facilitating all learning activities (Syahrir et al., 2023).

The acquisition of maximum value is evidence of good learning. With the problems that have been described, one of them is the use of less than optimal media that causes students to get bored easily while studying and causing unsatisfactory learning outcomes. so the right media is important. tools in the learning process and has a role called media (Ningsih, 2022). The existence of appropriate learning media will help in learning activities (Lawrence et al., 2018). In addition, the teaching and learning process is made interesting and not boring by the use of media, which can be used as a tool to transfer knowledge (Eka et al., 2024). The role of learning media is very important, especially with the

use of media in the learning process will be more effective because it helps students in providing stimuli related to learning material (Aristaria et al., 2024). In addition, as a tool in the form of learning media is needed to improve communication between teachers and students (Marpanaji et al., 2018). Therefore, with these problems, researchers will conduct a study entitled "Development of Pop-up books on Indonesian Cultural Property Materials to Increase Motivation to Study IPAS Class IV SDN 2 Protomulyo Kendal Regency". This research is very important to do because the learning components are interrelated such as goals, methods, materials, evaluation and media interact with each other in the learning process. At SD Negeri 2 Protomulyo class IV, especially IPAS learning material on Indonesian Cultural Wealth, the teacher in the lesson does not use learning media. That way if one of these components is not fulfilled the results will not be maximized, so the researcher develops Pop Up Book aims to increase student interest in learning and improve student learning outcomes.

There are several previous studies discussing Pop Up Books conducted by Nabila et al. (2021) with the title "development of Pop up Book Learning Media based on local wisdom in thematic learning in elementary school". The results showed that the developed media received a percentage score of 80% of teachers, 87% of students claimed to be practical. Pop up books can be recommended in learning. From the research that has been done above, it still has weaknesses, namely previous studies only used origami paper and buffalo paper so that it was less sturdy and easily wrinkled and used decorative images that were attached carelessly. To overcome this, the novelty, this pop up book uses A3 260 gsm ivory paper designed with Adobe Illustrator applications which are then printed and this pop up book focuses at Indonesian cultural material for elementary schools.

So development of Pop Up Book, aims to facilitate teachers in providing material. The Media will be arranged by adjusting to the student's character from the appropriate color, writing, and animation with the help of Adobe Illustrator applications

Method

Research and Development (R&D) is the design used by researchers. According to Sugiyono (2021) produce products, test the effectiveness of a hallmark of research development. SD Negeri 2 Protomulyo Kendal Regency is a place of research.

The research subjects totaled 31 students. The sample in a small group for the trial use of the product was taken as many as 9 fourth grade students who were

selected based on purposive sampling technique or sampling based on certain considerations (Sugiyono, 2021). Samples were selected based on class rank, namely 3 top-ranked students, 3 middle-ranked students, and 3 bottom-ranked students. This small-scale trial aims to get suggestions, input in order to determine the feasibility and readability of the media before being tested on a large-scale group. As for the large group test or at the product use test stage, there were 31 students from class IV. The data collection techniques used are observation, interviews, questionnaires and learning outcomes data. For data analysis, researchers conducted a normality test, Simple Paired T-Test, and N-Gain Test.

Researchers used the Borg and Gall model for this R&D research with stages, namely (1) potential and problems; (2) data collection; (3) product design; (4) design validation; (5) design revision; (6) product trial; (7) product revision; (8) usage trial; (9) product revision; (10) mass production. However, this research only reached stage eight or the usage trial due to limited costs for mass production. The following are the eight stages that will be carried out to develop research products.
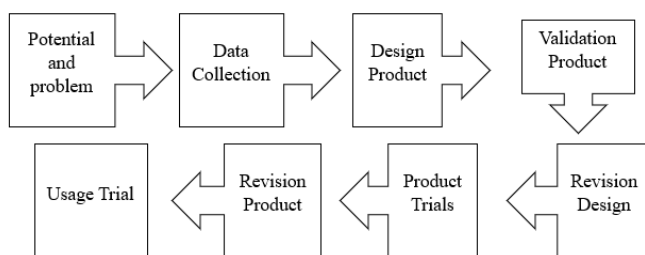

Figure 1. Borg and Gall model according to Sugiyono with 8 stages (Saktilia et al., 2024)

Through the above stages, Pop-up media produced books of Indonesian educational materials. Media with a range of three-dimensional books that move is the hallmark of Pop up books (Mamente et al., 2023). Fajriah et al. (2022) adding, pop up books have 3-dimensional elements when opened and can display images for children while reading because while reading pop up books, students can move and interact with what they read by displaying the images that appear in the book.

The development of technology is very rapid today and provides benefits in all aspects of life, especially in education (Rahmawati et al., 2024). Researchers utilize technology to design media.Pop Up Book media design was done with Adobe Illustrator application with the main material used being A3 260 gsm Ivory paper. Then the design was printed in poster form on A3 260 gsm paper (297 x 420 mm). The selection of ivory paper material is because it has better quality than other paper, ivory paper is thicker, not easily wrinkled, the print will be sharper and brighter, and has a shiny shiny surface.

This Pop Up Book learning media will contain: (1) preface; (2) table of contents; (3) instructions for using the book; (4) learning outcomes and Learning Objectives; (5) Indonesian Cultural Wealth Material; (6) Indonesian Cultural Wealth on each Island consisting of Provincial Names, Traditional Houses, Traditional Clothing, Typical Foods, Traditional Dances, Traditional Weapons, and folk songs; (7) Regional languages on each island of Indonesia; (8) Religions in Indonesia (9) Efforts to preserve Indonesian culture; (10) Author's bio.

Results and Discussion

The development of Pop Up Book media on the material of Indonesian Cultural Wealth for class IV SD Negeri Protomulyo 2 was developed through 8 stages of R&D (Research and Development) development of the Borg & Gall model, namely potential and problems; data collection; product design; design validation; design revision; product trial; product revision; and trial use.

Potential and Problems
Based on the results of observations, interviews, data on student learning outcomes and learning documentation at SD Negeri 2 Protomulyi, it was found that students' interest in learning was still low because students did not like IPAS learning which tended to be a lot of memorization, in teaching teachers delivered material conventionally such as using the lecture method without the help of learning media so that in class students were easily bored, not enthusiastic about listening to the material presented by the teacher. The low interest in learning makes student learning outcomes also not reach KKTP (Criteria for Achieving Learning Objectives) or student learning outcomes are still low. The selection of Pop Up Book media as a learning media to overcome these problems has been adjusted to the characteristics, needs of students obtained from the results of interviews and filling out questionnaires by students. The selection of Pop Up Book is appropriate because it is in the form of printed or concrete objects in accordance with the stages of thinking of elementary school children, which emphasizes concrete to abstract thinking.

Data Collection
Researchers distributed questionnaires to teachers and students to get data on what is needed by fourth grade students of SD Negeri 2 Protomulyo, Kendal Regency. The acquisition of questionnaire data that has been done obtained information that students need interesting learning media so that it can increase interest in learning and Pop Up Book design is packaged in bright colors, accompanied by learning objectives, a brief

explanation of the material and accompanied by animated images.

Product Design

Made based on results of questionnaire answers. Designed using the Adobe Illustrator application with the main material used being A3 260 gsm Ivory paper. Then the design is printed in poster form on A3 260 gsm paper (297 x 420 mm) using ivory paper. And interestingly packaged, it provides a visualization of a picture story that looks like it has dimensions in the image that can move when shifted, so it gives a pleasant impression when reading it (Setiyanigrum, 2020). So by observing directly, and information that can be repeated will increase students' learning motivation. The following is a display of Pop Up Book for Indonesian Cultural Wealth material.
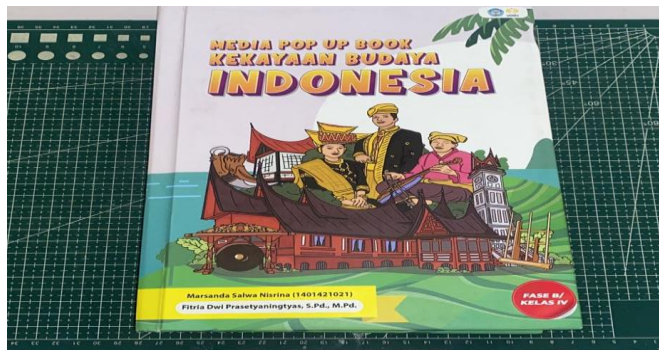

Figure 2. Pop up book media cover

Figure 3. Foreword

Figure 4. Instructions for using

Figure 5. Learning outcomes and learning objectives

Figure 6. Local cultural wealth of kaliwungu kendal

Figure 7. Cultural Wealth of Indonesia

Figure 8. Types of culture in the provinces of Indonesia

Figure 9. Regional languages

Figure 10. Religion in Indonesia and efforts to preserve it

Figure 11. Bibliography and developer profile

Design Validation

The pop up book learning media must then go through the media and material validation stage. Validation of learning media using questionnaires tailored to the provisions of the usefulness of Learning media. Then the validator gives an assessment of some of the statements in the questionnaire regarding which has developed Pop Up Book learning media. validation experts conducted an assessment, with the acquisition of a percentage of 93% and 93% by material experts. Based on the assessment, the Pop up book is said to be very feasible.

In line with research Ningsih with Pop Up Book for social studies learning obtained an assessment of 90% of

material experts in the category of "very Valid" and 70% of media experts (Ningsih, 2022).

Design Revision

The Pop Up Book Learning Media that has been developed by this researcher will be revised according to the suggestions and input from media and material validators. Here are presented the media design before and after revision.

Table 1. Pop Up Book Media Design Planning Before Revision and After Revision

Before revision	After revision
Figure 12. Before the revision there were four logos and the words Supervisor	**Figure 13.** After the revision, there are only two logos, and the words supervising lecturer have been removed
Figure 14. Before the revision there was only a Foreword, Instructions for using the book, and table of contents	**Figure 15.** After the revision, there is a foreword, instructions for using the book, table of contents, CP and TP
Figure 16. Before revision of learning outcomes on separate pages	**Figure 17.** After the revision, learning outcomes and learning objectives are on the same page
Figure 18. Before the revision of the media developer profile, only researchers without supervisors	**Figure 19.** After the Revision of the media developer profile, namely researchers and supervising lecturers

Product Trial

After going through the revision stage, the learning media can be tested directly on students on a small scale, with the number of SD Negeri 2 Protomulyo students as many as 9 people who were used, subjects in the Kendal Regency research the small-scale trial. The selection of students who took part in the small-scale trial was based on the purposive technique. Purposive sampling technique in Sugiyono's book is used to determine the sample in research by considering certain considerations (Sugiyono, 2021). The prerequisites that must be met when taking samples with purposive sampling, namely, based on certain characteristics and that certain characteristics characterize the population. With these considerations, this study will involve 3 different categories of students with a total of 9 students with high, medium and low student averages, each of these categories was taken as many as 3 students Of the 32 students in class IV of SD Negeri Protomulyo, Kendal. Small-scale trials aim to obtain information on readability from the media.

Media Pop Up Book get a great response with the provision of grades from students and teachers of 90% and 100% in the category of "very decent". So the media is said to be worth testing in large groups.

Trial Usage

Large scale trials were conducted on 31 fourth grade students at SDN 2 Protomulyo, Kendal Regency. The initial stage of students working on Pretest questions to determine students' initial abilities before getting material on Indonesian cultural wealth with the help of Pop Up Book media. Next, a posttest or question is at the end of the lesson will be given to find out changes after being given learning with Pop Up Book media.

Then, all students and teachers were given a questionnaire about suitability from Pop Up Book. Results of answers from questionnaires are used as consideration for improving or determining the feasibility of the learning media products that have been developed. The assessment criteria used are very effective 76%-100%, effective criteria 51%-75%, quite effective criteria 81-100%, feasible criteria 61-80%, less feasible criteria with a value of 41-50%. The table below shows the value obtained in table (2).

Table 2. Results of Student and Teacher Responses to Media Use Pop Up Book

Respondents	Percentage (%)	Criteria
Teacher	100%	Very Effective
Student	90%	Very Effective

Results of the learning media assessment questionnaire Pop Up Book 100% by teachers, 90% by students and categorized as "Very Effective", therefore

the author does not need to revise the media. Learning media products that have been developed, namely Pop Up Book.

Effectiveness of Pop Up Book

Learning outcomes using the media will be tested for differences and average improvement. Before that, it is necessary to find out what data you have obtained with normal distribution or not by means of normality testing. Due to the number of samples 31 or reduced from 50 then use the Shapiro Wilk normality test (Quraisy, 2020). Based on decision making, data that have a Sig value. > 0.05 then it is called normal distribution. On other hand, for data that have a Sig value. <0.05 then that data are not normal distributed (Wiwik et al., 2022). The following test results normality of this study:

Table 3. Results of the Normality Test

Learning Outcomes	Statistics	Df	Sig.
Pretest	0.954	31	0.202
Posttest	0.948	31	0.139

Result acquisition of pretest significance with Shapiro-Wilk obtained 0.202 >0.05 and 0.139 >0.05 posttest. It can be seen that the data is normally distributed.

Normal Data will be tested T to determine the average difference using paired sample t-test. With decision making if the data has a significant value (two sides) <0.05 , therefore the Ho boxed and the Ha will be accept and also if test obtains significant value (two tailed) > 0.05, thus Ho will be accepted and the other way around Ha will be rejected (Haryanti et al., 2021). The following table of test results that have been done:

Table 4. T-Test Results for Pretest and Posttest Values

Test criteria	T	Df	Sig. (2-tailed)
Pair 1 pretest score-posttest score	-9,677	31	0.000

As a result of testing paired sample t-test that has done by the author using the spss version 26 application, a significant value (two tailed) of 0.00 is obtained. It means significance value (two tailed) <0.05 then Ho is rejected and Ha is accepted. So the Pop Up Book "Indonesian cultural heritage" has a positive impact on learning outcomes.

Similar study conducted by Muna et al. (2024) product development Pop UP Book Crossword Puzzle to improve knowledge on IPAS subjects, obtaining significant values (2-tailed) 0.000 <0.05 which means Ha is accepted while H0 is rejected. Thus the average of the learning outcomes carried out by students showed changes after using the learning media. Then said media Pop Up Book effectively improve learning outcomes.

Furthermore, the last test is to determine the increase in the average student's value of the pretest and posttest by testing N-Gain. Table 5 presents the results of the N reinforcement Test.

Table 5. Results of the N-Gain Test Pretest and Posttest Values

Learning outcomes	Student	Average	N-gain value	Criteria
Pretest	31	60	0.560	tall
Posttest	31	83.22		

In the table above, we can see based on the calculations that have been made by researchers, we obtainthat the N-Gain value is 0.56 which means that Improved learning outcomes that have been carried out by students in these areas of Social Sciences is stated as Moderate. The percentage of N-Gain obtained by 56% which means the use of Pop Up Book products, "Indonesian cultural wealth" to help improve learning outcomes can be declared effective enough to be used.

Similar study that developed the Pop up Book by Jannah et al. (2021) the N-Gain score was obtained at 0.6781 and was classified as medium and media criteria proven to help make student learning outcomes better because it provides visual stimulation so that it can be a source of Student story material. Hermanyah in a study conducted by Doyan et al. (2020) said that the use of learning media helps students be creative, so they have many ways to solve problems. Visual stimuli obtained from pop up book illustrate a concept that was originally abstract can be clear, entertaining, and increase motivation (Anggraini et al., 2019).

It can be said from the test above that Pop Up Book products help increase motivation in understanding the material so that learning outcomes can be better. Researchers are able to create media creatively, innovative, interesting, appropriate to the times, so that the use of these media can improve student learning outcomes in the field of science, especially on the material "Indonesian cultural heritage" as well as facilitating teachers in delivering learning materials thus the learning objectives that have been determined can be met perfectly.

Interest and Learning Outcomes of Students Learning Using Pop Up Book Media

The success of learning is determined by the effectiveness of learning components such as goals, materials, methods, media and evaluation, these components interact with each other. Learning media is a component that must exist in the learning process. If one of the learning components does not exist, namely the media, the results obtained will not be maximized. The absence of media use makes less enthusiastic in understanding the teacher's explanation. Having an

interest in learning is very important in teaching and learning activities. Students who have no interest in learning a lesson can have a negative impact on their learning outcomes and academic achievement. Conversely, students who have a high interest in a lesson can have a positive impact on their learning outcomes and academic achievement. These results are reinforced by the statement that if students have a high interest in learning, the learning process will have an effect, otherwise if students do not have an interest in learning, it will not have an effect (Aprijal et al., 2020).

An internal factor that has a major influence on student learning outcomes is interest in learning. Students who have an interest in learning can help themselves in learning and understanding lessons because they have a high curiosity about what the teacher teaches (Khoridha et al., 2022). This learning interest affects student learning outcomes. The higher the interest found in students can motivate students to learn more enthusiastically and seriously (Wiradarma, 2021). Reinforced by Fadilah et al. (2023) opinion that the use of learning media is an effort to focus students' attention so that it can increase students' interest in learning. In this study to determine students' interest in learning using Pop Up Book media on Indonesian Cultural Wealth material, the teacher distributed questionnaires to students. Questionnaires were given before starting learning and after learning with Pop Up Book media. Below is presented a recapitulation of filling out the questionnaire of interest in learning by students in table 6.

Table 6. Percentage of Student Learning Interest

Results Student Interest	Average	Motivation Criteria
Before learning	55%	Quite
After learning	88%	Very Tall

Based on the results of the calculation of the percentage of student learning motivation using the spss version 26 application, the average percentage of learning motivation before using Pop Up Book learning media is 55% (Sufficient) and student learning motivation after using snakes and ladders learning media is 88% (Very High). This means that there is an increase in student learning motivation in IPAAS subjects on the material of Indonesian Cultural Wealth through the Pop Up Book game "Indonesian Cultural Wealth". The increase is not only reflected in student learning motivation but also student learning outcomes. The average student learning outcomes before using Pop Up Book media was 60 then the average learning outcomes increased after using Pop Up Book media to 83. Therefore, it is concluded that there is an increase in student learning outcomes. This is because students' interest in learning is high by using Pop Up Book media

students can see for real and imagine the material presented, also with an attractive form accompanied by pictures so that motivating students to be more enthusiastic in learning in class can help students imagine the material being studied, also the interesting shape of the media makes students.

Conclusion

The research that has been presented develops a learning media product in the form of pop up material on Indonesian Cultural Wealth on each Island consisting of provincial names, traditional houses, traditional clothing, special foods, traditional dances, traditional weapons, and folk songs that are designed to be attractive to elementary school students, have elements of length, width and height or commonly called 3 dimensions that can arise and move when the page is opened, and as a messenger to students so that learning becomes more interesting and fun. The media made was also tested for feasibility by learning media expert validators to obtain a score with a percentage of 93% by material experts categorized in the "very feasible" criteria. Then after being tested in learning, the results of filling out a questionnaire related to the teacher's response to the use of media in learning were 100% by teachers, 90% by students and categorized as "very effective learning. Media products that have been developed by researchers have proven to be effective in increasing students' interest in learning so that students are motivated to be more enthusiastic about learning the material of Indonesian Cultural Wealth class IV at SD Negeri 2 Protomulyo Kendal Regency. That way, student learning outcomes have also increased due to high student motivation to take part in learning. This is evidenced by the acquisition of a learning interest questionnaire given to students before learning to get a percentage of 55% then from the results of the questionnaire given after participating in the learning has increased to get a percentage of 88. Then, the acquisition of Paired Sample t Test testing which obtained a significance value of 0.00 <0.05 means that there is a significant difference in the average before learning using Pop Up Book and using Pop Up Book. Furthermore, the calculation of the N-Gain score of 0.56 indicates an increase in the average value of students.

Conflict of Interest
There is no conflict of interest with this research.

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