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Development of Pop-Up Books Based Microsoft Powerpoint to Improve Critical Thinking Skills in Elementary School

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Abstract

This research and development was motivated by the low critical thinking skills of students. The purpose of this study was to improve the critical thinking skills of fifth-grade students at Sidayu Public Elementary School. In this study, the researcher used a Research & Development (R&D) approach, which consists of the following stages: needs analysis, product design planning, product development, product validation, and field testing of the product. The feasibility of the product was obtained from expert validation assessments, while the practicality of the learning media was obtained based on the responses of teachers and students. The effectiveness of the media was measured by comparing student learning outcomes before and after using the learning media. The results showed that the Microsoft PowerPoint-based Digital Pop-Up Book learning media obtained very feasible results, analyzed from the aspects of design, material suitability, and practicality in its use. Based on the responses of teachers and students, the Microsoft PowerPoint-based Digital Pop Up Book learning media is practical and easy to use. In addition, the results of the study indicate that there are significant increase in students' critical thinking skills. Thus, the learning media developed in this study is feasible to be used as an effort to improve students' critical thinking skills in elementary schools.

Keywords: critical thinking, digital pop-up book, learning media, elementary school

INTRODUCTION

One of the main objectives of the Indonesian State, as stated in the 1945 Constitution, Paragraph 4, is to "Educate the Nation". One way to achieve this goal is to utilize the quality of education available in Indonesia.

The education system in Indonesia is currently regulated and based on the curriculum. In 2025, the Indonesian education system, which was originally based on the independent curriculum, will undergo changes with the introduction of the Deep Learning approach. Deep learning focuses on and aims to reinforce the achievement of graduate profile dimensions. Through the curriculum, the educational process in schools can be carried out properly and hopefully become one of the solutions to educate the nation. To realize student-centered learning, a conscious, meaningful, and joyful learning atmosphere can be created through holistic and integrated thinking, heart, taste, and sports.

One of the compulsory subjects in the current curriculum is IPAS. The IPAS subject has a different scope. Originally separate subjects, namely Science and Social Studies, have now been combined into IPAS. The combination of these subjects does not create any significant differences, and both subjects remain within their respective scopes and aspects. According to (Susilowati, 2023) the scope of IPAS material is a branch of science that studies living and non-living things in nature and their interactions, as well as studying human life as individuals and as social actors who are connected to their surrounding environment. IPAS learning plays an important role in developing behavior, skills, knowledge, and enabling students to be active in taking on the elements of life in the future (H. A. R. dan B. Kurnianto, 2023).

The current curriculum in Indonesia is supported by a deep learning approach.. According to (Hariyono et al., 2025) The uniqueness of deep learning lies in its ability to simultaneously develop students' cognitive, affective, and psychomotor aspects, which ultimately shape individuals with eight dimensions of graduate profiles and not just mastery of subject matter. These eight dimensions of graduate profiles are interrelated and shape individuals in line with Ki Hajar Dewantara's educational philosophy, which emphasizes the importance of balance between creativity, emotion, and willpower. In this case, it can be proven that IPAS learning is in line with the strengthening and development of the eight dimensions of graduate profiles..

The eight dimensions of graduate profiles are the result of knowledge, skills, and character achievements. In addition, the eight dimensions of graduate profiles also improve graduates—graduates who have a spirit of leadership that is integrity, professional, and transformative. According to (Anwar, 2025), the eight dimensions of graduate profiles are a concept in Indonesian education that refers to eight aspects of competence that every individual or graduate should possess. These eight dimensions of graduate profiles are a concept created for education in Indonesia that focuses on student development in terms of knowledge, skills, and character possessed by each individual.

One aspect of the eight dimensions of graduate profiles is Critical Reasoning or a change from the profile of Pancasila students with critical reasoning. According to (Lilihata et al., 2023), critical thinking is an ability or skill possessed by students to process and analyze various qualitative and quantitative information objectively, examine and evaluate reasoning, reflect on the results of their thoughts and thinking processes, and make decisions about what they are facing. This critical reasoning ability is very important to support students in facing the developments of the times. Critical reasoning ability is a tangible form of critical thinking that involves analysis and evaluation based on the evidence found. Critical thinking can shape students in interpreting, analyzing, and providing solutions to problems (B. Kurnianto & Haryani, 2020). Through the problems given to students, their critical thinking skills will improve. This is because students will become accustomed to facing problems and making the right decisions so that indirectly they will analyze problems and, over time, their critical thinking skills will improve.

According to (Lia et al., 2023), critical thinking skills will always face obstacles or challenges, especially in strengthening the eight dimensions of graduate profiles, including an educational curriculum that does not prioritize character building and critical thinking in students, a lack of understanding among students about the values of Pancasila and their relevance in everyday life, to the absence of a balance between an authoritarian approach and independence in the learning process, so that students only accept what the teacher wants without being encouraged to think critically, and students only focus on mastering and understanding the subject matter.

Poor critical thinking skills certainly have an impact on students. A very noticeable impact is that students will have difficulty when faced with a problem. They cannot solve the problem with the best solution and become passive individuals who are very dependent on others. In addition, students will also have low self-confidence because they do not believe in themselves regarding the decisions they will make or have made. Furthermore, with low critical thinking skills, students cannot access broader knowledge because they only rely on the information they have already obtained, which can be one of the causes of declining student learning outcomes. This is a challenge and a major focus for educators to find ways to improve critical thinking skills. In order to play an important role in this era of globalization, every citizen is required to have the skills to respond to the demands of the times (Rini et al., 2023).

Based on interviews and observations conducted by researchers in fifth-grade of Sidayu Elementary School on March 10, 2025, it was found that the students' critical thinking skills were low. This was evident when the students were given an assignment about maps, as there were still several children who had not completed and understood the material. The students also said that in IPAS lessons, they did not fully understand the material presented by the teacher. This could cause some students to achieve low learning outcomes in science and mathematics. These learning outcomes also prove that the critical thinking skills of fifth-grade students at Sidayu Elementary School are low. In addition, one of the causes of this problem is that Sidayu Elementary School has not fully utilized its facilities, especially in an effort to improve students' critical thinking skills, and its human resources have not been able to fully utilize the available facilities. Furthermore, students also lack confidence in the answers they have determined, so they need

validation from others, especially from teachers. Therefore, the school and teachers must continue to explore efforts to improve students' critical thinking skills.

There are many types of learning media that can be used to improve critical thinking skills. One such learning medium is the pop-up book. In today's era, pop-up books have also been developed using existing technology, resulting in the creation of digital pop-up books, which are more efficient in terms of production and use. With pop-up books as a learning medium, students are more enthusiastic and do not get bored because they are not only reading the information provided, but also seeing pictures that support the information.

This research is novelty in its use of Microsoft PowerPoint as the main digital design platform in the development of Pop Up Books. Microsoft PowerPoint-based Pop Up Books are learning media that display 3D images and can be inserted with text to support the explanation of each slide. In addition, this learning media adds audio to support the material, which is expected to provide understanding to students. In addition to audio, another innovation in this research is the inclusion of analysis and quizzes that can support the improvement of students' critical thinking skills, especially in science subjects.

In the issue of critical thinking skills, many researchers want to solve learning problems and improve the quality of learning. Thus, this development research was conducted to determine the effect of improving critical thinking skills through the development of Microsoft PowerPoint-based Digital Pop-Up Books.

METHOD

This research and development uses a qualitative and quantitative approach (Mixed Methods). The qualitative approach is applied at the level of needs analysis, product development, and media feasibility. Meanwhile, the quantitative approach can be applied in testing the improvement and effectiveness of Microsoft PowerPoint-based Digital Pop Up Book learning media on students' critical thinking skills.

This research and development falls under the category of research and development (R&D). Research and development (R&D) is a type of scientific activity carried out in a structured and systematic manner based on an analysis of problems that have been carried out to develop specific innovations in the form of products or models that can be tested and are effective in terms of their scientific usefulness and feasibility (Waruwu, 2024) This study also applies the ADDIE Model, which consists of five stages, namely analysis, design, development, implementation, and evaluation. The ADDIE Model is used to obtain valid results because the stages of research must be in accordance with these five stages.

This study was conducted at Sidayu Elementary School, Bandar District, Batang Regency, Central Java. The researcher conducted the study by involving all 28 fifth-grade students at Sidayu Elementary School. This study was conducted during the even semester of the 2025/2026 academic year. In addition, the researcher also used a One Group Pretest-Posttest research design, which uses pretest and posttest as a basis for comparing the impact of a product. Meanwhile, the type of research sample used was a saturated sample taken entirely from fifth-grade students as subjects of the activity of using Microsoft PowerPoint-based Digital Pop-Up Books.

The data collection techniques used in this research and development are test and non-test data. A test is a way to carry out an assessment in the form of a task that must be completed by students so that a score can be obtained regarding the behavior or ability level of the students, which can then be compared with the scores obtained by other students (Mahendra et al., 2024). The testing technique in this study used a written test in the form of multiple choice questions (pre-test and post-test). Non-testing is a type of research instrument that has an integrated nature because it can take the form of statements and questions with open-ended responses, which can be counted to obtain nominal frequency data or the number of answers (Pinton Setya Mustafa et al., 2022). The non-test techniques used were observation, interviews, questionnaires, and documentation.

Data analysis used in research and development utilizes quantitative and qualitative data. Qualitative data is data that takes the form of detailed descriptions, direct quotations, and problem documents (Millah et al., 2023). Quantitative data is data that focuses on statistical, mathematical, or numerical analysis of the collected data (Suprihartini et al., 2023). This quantitative data was used to determine whether there was an increase in students' critical thinking skills after using the learning media.

After obtaining the pretest and posttest results, the data was then tested for normality using SPSS version 27 software. This normality test used the Shapiro-Wilk test because the data obtained from respondents was less than 50 respondents using a significance level of 0.05.

The effectiveness of media is measured using the N-Gain test and the t-test. In this study, the N-Gain test was applied to see whether there was an increase in student learning outcomes before and after the application of learning media (Hasrudin & Asrul, 2020). Meanwhile, the t-test in this study used the Paired Sample T-Test. According to (Al Amin & Juniati, 2021), the paired sample t-test is one of the statistical methods used to measure the mean of two variables used.

RESULTS AND DISCUSSION

Results

The needs analysis stage, which was carried out through observation and interviews in fifth-grade of Sidayu Public Elementary School, showed that students had difficulty understanding the material presented by the teacher. This resulted in low critical thinking skills among students during the learning process. Based on this analysis, it is clear that there is a need for learning media that can improve students' understanding so that their critical thinking skills will also improve.

Based on the results of the needs analysis, the researcher developed a learning medium, namely a Microsoft PowerPoint-based Digital Pop-Up Book, as an effort to improve the critical thinking skills of fifth-grade students at Sidayu Elementary School. The development of this medium will then be assessed in terms of its feasibility, effectiveness, and improvement in thinking skills through the use of the Microsoft PowerPoint-based Digital Pop-Up Book learning medium.

The Results of Development Product

In this study, researchers developed a Microsoft PowerPoint-based Digital Pop-Up Book learning medium. This study aims to improve critical thinking skills through the developed learning media, namely the Microsoft PowerPoint-based Digital Pop-Up Book. The Digital Pop-Up Book is a pop-up book with 3D elements that displays attractive images and can be accessed anytime and used for a long period of time. This Digital Pop-Up Book can be used anytime and anywhere because it can be accessed without an internet connection.



Figure 1. Digital Pop-up Book Cover

The design of this learning media has been adapted to the problems found in the learning process of fifth-grade at Sidayu Elementary School. This learning media is designed with an attractive appearance to increase students' interest in learning. The following is the cover of the Microsoft PowerPoint-based digital pop-up book.

This learning media does not only display images and text. However, this Digital Pop Up Book learning media is equipped with audio or background music that supports the material being displayed. In addition, this learning media is also equipped with analysis and quiz activities that are expected to improve students' critical thinking skills. Below is an example of a page in the Digital Pop-Up Book media.



Figure 2. Example of Material Display in the Media

The elements used in the media have also been adapted to the age of fifth-grade students at Sidayu Elementary School. This allows students to easily understand the content of the media and stimulates their curiosity, which increases their interest in learning.

Results of Expert Validation

Once the learning media met the researcher's expectations, the researcher then tested the feasibility of the media by involving media experts and subject matter experts. In addition to testing feasibility, this stage also aims to obtain suggestions and input from media experts and subject matter experts so that the developed product can be in line with the research objectives. The instruments given to media experts and subject matter experts used a Likert scale. In addition, each instrument covered aspects relevant to the media and material used in this study.

The validation instruments for this material cover several aspects, including the suitability of learning outcomes and objectives, the language and terminology used, the depth of the material, and the questions contained in the media. Based on the results of media validation conducted by subject matter experts, the results were categorized as highly suitable.

Table 1. Results of material validation

Assessment aspects	Average score	Category
CP and TP Suitable	5,00	Very Feasible
Language and Terminology	4,66	Very Feasible
Depth of material	5,00	Very Feasible
Questions	4,75	Very Feasible
Average	4,85	Very Feasible

In addition, validation results were also obtained from media experts. The media validation instruments covered several aspects, namely visual design and media display, practicality of use, and media feasibility. Based on the feasibility test results conducted by media experts, it was found that the Microsoft PowerPoint-based Digital Pop-Up Book learning media was classified as highly feasible.

Table 2. Results of media validation

Assessment aspects	Average score	Category
Visual Design and media display	4,5	Very Feasible
Practicality of use	4,5	Very Feasible
Media suitability	4,6	Very Feasible
Average	4,53	Very Feasible

Product Trial Results

Digital Pop Up Book learning media based on Microsoft PowerPoint that has passed the feasibility stage can then be used in the trial stage. Before the learning media is applied to a large group, it must

undergo a trial stage with a small group. This small group trial stage is carried out in classes that are higher than the classes used for research. This is done so that the researchers can obtain the necessary feedback to improve the media so that it can be applied to a large group in a better version.

The use of media in this small group received positive responses from students. Students were enthusiastic and highly focused during the implementation of the learning media. In this implementation, the researcher used an LCD projector as a test material. In addition to the students, teachers involved in this trial phase also provided positive feedback and stated that the learning media developed was in line with the learning objectives and very interesting for students because it had attractive and innovative visualizations.

To obtain these results, students and teachers filled out response questionnaires after the media was implemented. The following are the results of student responses to the use of Microsoft PowerPoint-based Digital Pop-Up Book learning media.

Table 3. Results of student response to media use

Assessment aspects	Average score	Category
Media	4,08	Good
Content	4,25	Very Good
Usefulness	4,51	Very Good
Average	4,28	Very Good

Based on the data above, there are three aspects in the student response questionnaire. This small group test involved seven students and the results showed that the Pop Up Book Digital learning media was feasible because it received an average score of 4.28 and was categorized as very good. However, the use of LCD projectors did not show student activity in the learning process. Therefore, researchers must find other strategies so that student activity in the learning process can also be observed.

Results of Media Effectiveness

The Microsoft PowerPoint-based Pop Up Book Digital learning media was then implemented in a large group, namely in the fifth grade of Sidayu Elementary School. To obtain the results of the effectiveness of the media in the learning process, the researcher needed pretest and posttest data. The pretest and posttest results were then analyzed using SPSS version 27 software. This analysis will then show an increase in students' critical thinking skills and the effectiveness of learning media in the learning process.

The effectiveness of Microsoft PowerPoint-based Digital Pop-Up Book learning media was obtained from the results of a comparative analysis before and after the use of the media. These results were obtained from the application of learning media in fifth-grade of Sidayu Elementary School.

Table 4. Results of media effectiveness

Data results	Average
Pretest	37,67
Posttest	73,57
N-gain Score	0,60
N-Gain Persentase	60,98

Based on the above results, the pretest and posttest results showed an average increase. In addition, the N-Gain Score result was 0.60 or 60.98%. These results have met the coefficient interval with a moderate and quite effective category. Based on these results, it can be concluded that this learning media is quite effective in improving the critical thinking skills of fifth-grade students at Sidayu Elementary School. The use of learning media is supported by the technology owned by the school, namely IFP (Interactive Flat Panel) or commonly known as PID (Digital Interactive Board). This technology helps the media to be more interactive and increases student enthusiasm.

Discussion

Development of Digital Pop-Up Book Learning Media Based on Microsoft PowerPoint

This research is a type of research and development (R&D). The researcher used the research and

development model from (Prof. Dr. Sugiyono, 2023), namely the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). In the ADDIE model, there are steps with different tasks, such as: 1) Needs Analysis; 2) Data Collection; 3) Product Design; 4) Product Validation; 5) Product Revision; 6) Small Group Testing; 7) Product Revision; and 8) Large Group Testing.

In this research and development, researchers developed media based on the results of a needs analysis that had been carried out and identified several problems in the learning process in fifth-grade of Sidayu Elementary School. The learning media developed by researchers in this study was Microsoft PowerPoint-based Digital Pop-Up Book learning media. This Digital Pop-Up Book learning media is a type of media with a 3-dimensional display. According to (Nugroho et al., 2025) the citation by Sobakhah & Bachtiar, Digital Pop-Up Book learning media is a type of digital-based book that can provide amazing visual images. This Digital Pop-Up Book has a main focus, namely observation activities. Thus, through the development of this Digital Pop-Up Book media, students' critical thinking skills can be improved. This Digital Pop-Up Book learning media can improve students' critical thinking skills because in the media, researchers not only include material but also activities that require students to perform analysis and observation activities. The use of learning media in this study is assisted by IFP (Interactive Flat Panel) technology, often referred to as a Digital Interactive Board.

This learning media was created to provide a new learning experience for both teachers and students. The Pop Up Book Digital learning media was designed to improve students' critical thinking skills and interest in learning. This learning process is in line with the learning model chosen by the researcher, namely Problem-Based Learning or a learning model based on problem solving. Through this Problem-Based Learning model, learning becomes more effective and efficient, especially in efforts to improve students' critical thinking skills (Dwi Aulia et al., 2023). The learning process using the Digital Pop-Up Book media is in accordance with the teacher's instructions and the learning needs of the students.

Suitability of Learning Media

The development of Microsoft PowerPoint-based Digital Pop Up Books was tested for feasibility by lecturers or media validators and material validators in terms of the suitability of the material used in the learning media developed. According to (Raihanul Muhsan, Nafisah Hanis, 2022). the feasibility test aims to obtain results, suggestions, and comments from validators so that the product is of high quality and suitable for use in the learning process. The testing was carried out by filling out a validation assessment instrument that had been adjusted to the content of the media and material. In this study, the researchers used four feasibility categories, namely Very Feasible, Feasible, Not Feasible, and Very Not Feasible.

Expert assessment of the material was conducted on several aspects relevant to the content of the material, namely the aspects of Learning Outcomes and Learning Objectives, Language and Terminology, depth of material, and questions. Based on the assessment of these four aspects, the researcher received positive feedback from the material validators. Through the material validator assessment test, the researcher obtained results in the excellent category. In addition, based on the percentage obtained, the researcher obtained average results in the very good category. Based on the validator results, the material used in the Microsoft PowerPoint-based Digital Pop-Up Book learning media is suitable for use in supporting the learning process.

Media feasibility assessment was conducted on several aspects relevant to the product that had been created, namely visual design and media display, practicality of use, and media feasibility. The media validator's assessment results obtained a percentage score in the excellent category and an average score in the very feasible category. According to media validators, the learning media developed still requires several improvements. Based on the suggestions and input from the media validator, there are several improvements that can be made, including the use of fonts, the placement of elements and images, the selection of color contours, and adjustments to the background music or sounds used in the learning media. The input from the media validator was then immediately corrected by the researcher and a revision report was submitted to the media validator. After that, the media was declared feasible and approved for use in the learning process.

Based on the results of media and material validation activities, it can be concluded that the Microsoft PowerPoint-based Pop Up Book Digital learning media and Cultural Heritage Material are very suitable for use in the IPAS learning process for fifth-grade at Sidayu Elementary School.

Improvement in Students Critical Thinking Skills

This research and development is a research activity that aims to improve students' critical thinking skills through Microsoft PowerPoint-based Digital Pop-Up Book learning media. The learning process carried out in this study uses the Problem-Based Learning (PBL) model to support the learning process, particularly in the use of Microsoft PowerPoint-based Digital Pop-Up Book learning media. The researcher applied the learning media to two groups, namely a small group involving seven students and a large group involving 28 students. This Digital Pop-Up Book learning media is an innovative interactive learning media that can play a positive role in the critical thinking skills of elementary school students (Putri & Julianto, 2025). This Pop-Up Book learning media has a 3D display with a main focus on observation activities. This supports students' mental stimulation, thereby improving their critical thinking skills. Through the Digital Pop-Up Book learning media, learning has a positive influence on students because they can understand the content and material in the media by observing, so that students have no limitations in examining the content of the Pop-Up Book media (Timantiotiningrum & Nurharini, 2024).

The improvement in critical thinking skills will be determined based on the results of the normality test of the pretest and posttest data that students have completed during the learning process. This normality test is conducted to determine whether or not there is an effect of learning media on the improvement of students' critical thinking skills (Maharani & Khalil, 2025). In addition, this normality test is used so that researchers can determine whether the sample used is normally distributed or not.

The first application of Microsoft PowerPoint-based Digital Pop Up Book learning media in a small group test. The students involved in this small group test had varying abilities. In the learning process, students obtained Pretest and Posttest scores, which were then tested for normality so that the researcher could determine whether the data obtained was normally distributed or not. Based on the results of the pretest and posttest, it was found that the data obtained met the normality assumption, or in other words, the data obtained came from a normally distributed population.

The application of the second learning media, Digital Pop-Up Books based on Microsoft PowerPoint, was on a large group. The application of media in this group was the final result that the researcher used as the outcome of the research and development. Based on the pretest and posttest scores of the large group, it was found that the normality test results met the normality assumption. Thus, it can be concluded that the data obtained came from a normally distributed population. This is in line with the research conducted by (Gladisya Audita Azzahra, Destri Astrianingsih, 2021) entitled "The Effect of Canva-Assisted Digital Pop-Up Book Learning Media on the Critical Thinking Skills of Fourth Grade Students on Plant Body Parts" which applied Digital Pop-Up Book learning media and obtained normally distributed data.

Based on the results of the normality test in both applications, it can be concluded that the Microsoft PowerPoint-based Pop Up Book Digital learning media has an effect on improving students' critical thinking skills in the learning process. This is because the pretest and posttest results in both groups are normally distributed.

Effectiveness of Learning Media

The effectiveness of using Microsoft PowerPoint-based Digital Pop Up Book learning media in this study was proven by the results of the N-Gain test and T-Test. To test the effectiveness of the media, researchers needed pretest and posttest data, which could then be tested using the N-Gain test and T-Test. Both tests were conducted using Microsoft Excel and SPSS version 27 software. The N-Gain test is a common method used by researchers to measure the effectiveness of a study in learning (Gustati, Fera Sriyunianti, Ferdawati, 2025). In research, especially educational research, researchers use the N-Gain test to measure the effectiveness and influence of something in the learning process. In addition to the N-Gain test, this study also uses the T-Test to measure the effectiveness of using Microsoft PowerPoint-based Digital Pop-Up Book learning media in this study. The T-Test used in this study is the Paired Sample T-Test. The Paired Sample T-Test is a type of hypothesis testing using non-independent data, or in other words, paired data. With the results of the N-Gain Test and the Paired Sample T-Test, the level of difference in effectiveness and the strength of the effectiveness of using Microsoft PowerPoint-based Digital Pop-Up Book learning media will be obtained.

After implementing the Digital Pop-Up Book learning media in large groups, the researchers

obtained pretest and posttest data. The pretest and posttest data were then tested for normality and found to be normally distributed, as explained earlier. After determining that the data were normally distributed, the next step was to calculate the N-Gain to determine the extent of the improvement. The N-Gain test was conducted using Microsoft Excel software and obtained N-Gain results in the moderate category and percentage results in the fairly effective category. These results are in line with the results of a study entitled "Development of Digital Pop-Up Books to Identify the Main Ideas of Expository Texts in Fifth Grade Students at Pati Lor 05 Public Elementary School," which obtained N-Gain results in the moderate category (Antartika & Nuryanto, 2025).

The next step is to test the Paired Sample T-Test. The Paired Sample T-Test calculation uses SPSS version 27 software. Based on the Paired Sample T-Test, the results are accurate. Therefore, it can be concluded that there is an effect of using Microsoft PowerPoint-based Digital Pop-Up Book learning media. From the results of the Paired Sample T-Test, it can be seen that the Microsoft PowerPoint-based Digital Pop-Up Book learning media is feasible and effective in improving the critical thinking skills of fifth-grade students at Sidayu Public Elementary School.

Based on the results of the N-Gain Test and Paired Sample T-Test, it can be seen that the use of Microsoft PowerPoint-based Digital Pop-Up Book learning media is quite effective and there is an influence between before and after the use of Microsoft PowerPoint-based Digital Pop-Up Book learning media.

CONCLUSION

Based on the results of the research and development that has been carried out, it can be concluded that the Microsoft PowerPoint-based Digital Pop Up Book learning media developed in this study is considered very feasible, practical, and effective, especially in improving the critical thinking skills of fifth-grade elementary school students. The feasibility of this media is demonstrated by the results of expert validators. The feasibility of this media can also be seen from the suitability of the material with the visual design, ease of use, and the feasibility of the media itself. The practicality of this media can be seen from the positive responses from teachers and students, while the effectiveness of this learning media can be proven through the improvement of students' critical thinking skills in the learning process.

The Microsoft PowerPoint-based Digital Pop-Up Book learning media has been updated in terms of the material used, namely the cultural heritage of Central Java, and focuses on improving students' critical thinking skills. In addition, the Microsoft PowerPoint-based Digital Pop-Up Book learning media is supported by audio characteristic of Central Java, which provides a new feel to the development of technology-based Digital Pop-Up Book learning media. However, even though the Microsoft PowerPoint-based Pop Up Book Digital learning media has new features that differ from previous studies, this study certainly has shortcomings, namely in the process of using media that must be supported by adequate electronic devices. This is because there are many elements used in Microsoft PowerPoint-based Pop Up Book Digital learning media, so that the process of loading images on the page often has obstacles and takes a relatively long time. Additionally, the focus of the material presented is limited to cultural heritage alone because the more slides produced, the slower the media's operational process becomes.

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