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Improving Student Learning Outcomes in Online Learning by Using Electronic Teaching Materials

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ABSTRAK

Ketersedian bahan ajar yang dapat digunakan dalam pembelajaran jarak jauh atau tatap muka mengakibatkan guru hanya berpatokan pada satu buku saja dalam melaksanakan pembelajaran. hal tersebut mengakibatkan pemelajaran menjadi monoton dan siswa tidak memiliki minat belajar. Penelitian ini betujuan untuk mengembangkan bahan ajar elektronik bergambar materi bangun ruang kelas V sekolah dasar yang telah dinyatakan valid dan layak serta memiliki efektifitas pada proses pembelajaran. Penelitian ini merupakan penelitian pengembangan dengan model penelitian menggunakan model ADDIE. Subjek pada penelitian ini adalah orang ahli, 3 orang guru, dan 68 orang siswa kelas V SD. Teknik pengumpulan data yaitu menggunakan angket dengan instrumen berupa lembar penilaian dan angket. Data dianalisis tahap validitas menggunakan rumus Gregory, validitas hasil perhitungan tabulasi dihitung unntuk mencari persentase, pengambilan keputusan terkait respon peserta didik dan guru menggunakan skala likert dengan lima alternatif jawaban dan keefektifan menggunakan skor ter-normalisasi menunjukkan tingkat efektivitas perlakuan dari perolehan skor atau posttest. Diperoleh dari ahli isi dan ahli media dan desain secara keseluruhan adalah sangat baik, untuk respon guru dan peserta didik secara keseluruhan mendapat respon sangat positif dan keefektifan mendapat kreteria tinggi. Berdasarkan hasil tersebut maka dapat dikatakan bahwa bahan ajar elektronik yang dikembangkan dinyatakan valid dan efektif.

ABSTRACT

The availability of teaching materials that can be used in distance or face-to-face learning causes teachers to rely only on one book in learning. It causes learning to be monotonous, and students have no interest in learning. This study aims to develop illustrated electronic teaching materials for fifth-grade elementary school classroom building materials that have been declared valid and feasible, and have effectiveness in the learning process. This research is development research with a research model using the ADDIE model. The subjects in this study were experts, three teachers, and 68 fifth-grade elementary school students. The data collection technique uses instruments such as an assessment sheet and a questionnaire. The data were analyzed in the validity phase using the Gregory formula, the validity of the tabulation calculation results was calculated to find the percentage, decision making related to the responses of students and teachers using a Likert scale with five alternative answers, and effectiveness using a normalized score showed the level of treatment effectiveness from the score or posttest. Obtained from content and media experts, the overall design is very good, for the response of teachers and students as a whole gets a very positive response, and the effectiveness gets high criteria. Based on these results, it can be said that the electronic teaching materials developed are valid and effective.

1. INTRODUCTION

The COVID-19 pandemic has had an impact on the world of education (Giary & Darmayanti, 2021; Setyaningrum & Yanuarita, 2020). The existence of a pandemic causes learning to be carried out remotely (Kurniawan, 2021; Tarman & Sholeh, 2021). Therefore, the implementation of learning is still carried out remotely for some conditions (Tarman & Sholeh, 2021). Such learning conditions make teachers more creative in designing learning processes with an interesting learning atmosphere and significantly impact

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students (Kurniawan, 2021; Saifuddin, 2021). An interesting learning atmosphere for students will make students or students more active in participating in learning (Berlyana & Purwaningsih, 2019). In addition, it is very important to increase students' interest in learning in both online and in-person learning (Basa & Hudaidah, 2021; Rohani & Zulfah, 2021). Good learning interest in students will be able to create a more active learning atmosphere (Muammar & Suhartina, 2018; Siswanti, 2019). Having a good interest in learning, students can easily develop their potential so that learning objectives can be achieved properly (Alifah et al., 2019; Muammar & Suhartina, 2018). Creating an interesting learning atmosphere for students can be done by using learning media as a tool for teachers to build a learning atmosphere that is not monotonous and can help students understand learning material (Oktafiani et al., 2020). In addition, the existence of learning media in the learning process can also increase students' interest in learning (Nursyam, 2019; Puspitarini & Hanif, 2019; Sumyadi et al., 2020). Therefore, it is very important to have learning media in the learning process because it will be able to help teachers and students understand the learning material and will be able to increase students' interest in learning (Andriyani & Suniasih, 2021; Ntobuo et al., 2018). With online learning, it is necessary to pay attention to the teacher in choosing learning media. The learning media used must also be able to be used in online learning. For example, by using learning media based on developed technology.

But in reality, in the learning process, both direct and distance learning, teachers rarely use learning media that can support the ongoing learning process (Azrina & Latifah, 2020; Syahroni et al., 2020). Many teachers still only use one book reference in carrying out direct learning to students (Crisnawati et al., 2022; Jaudin et al., 2021). During distance learning, most teachers only provide photos from reference books to students without using other learning media that can support distance learning (Nugraha et al., 2021). In addition, the current condition of teachers is very rare in using developing technology (Purnasari & Sadewo, 2021; Saikhu et al., 2021). It follows the observations that have been made previously. In the initial observation, it was known that the teacher only relied on one book reference in carrying out the learning process. The learning process that teachers carry out is also very less in using learning media. It can harm student development. By being taught using only one reference book, it will be difficult for students to understand the learning material being taught (JUNIANTARI, 2021; Salmia & Yusri, 2021). It is difficult to understand the material students because the material being studied is limited (Andriani et al., 2019; Wahyuningsih et al., 2022). In addition, other impacts that can arise from using only one reference book in the learning process can cause students' interest in learning to decrease (Maulidina & Bhakti, 2020). The one-way learning process causes the student's interest in learning, so learning becomes monotonous (Fansury et al., 2020; Tusyana & Luciana, 2019). Therefore, it is necessary to have supporters in the learning process so that learning does not run in one direction and is monotonous for students.

The solution that can be done is to carry out learning using learning media. Learning media will facilitate interaction or material delivery between students and teachers to make learning more effective and efficient (Afandi et al., 2021). The existence of learning media can increase students' interest in learning, can instill the basic concepts of true and real learning so that it can be implemented in students' daily lives, can provide a real experience to students, and lay the foundation for thinking to encourage students to be more active in the learning process so that can increase student interest in learning (Dwijayani, 2019). Using learning media based on technology can impact the learning process because using such media will make it easier for teachers to deliver learning materials to students wherever and whenever (Rahayu et al., 2022). It can also happen to students where students will find it easier to learn subject matter anywhere and anytime. One type of learning media that can support the online learning process is learning media with the help of technology or the internet network, for example, electronic teaching materials. Teaching materials are a guideline that underlies competence in learning activities. Students can use teaching materials to study independently (Ardiani, 2022; Rahayu et al., 2022).

Previous research findings show that electronic teaching materials greatly impact the learning process. Previous research found that the developed flipbook-based electronic teaching materials were feasible and effective in improving learning outcomes while successfully increasing students' visual, oral, listening, writing, and emotional activities (Yulaika et al., 2020). The results of other research that have been carried out have found that the developed electronic teaching material media is suitable for use in the learning process (Seso et al., 2019; Yulaika et al., 2020). Although many have conducted development research that develops electronic teaching materials, no development research develops electronic teaching materials by adding practice questions. In this study, electronic teaching materials were developed by adding practice questions. This study aims to develop electronic teaching materials on the content of learning mathematics with serial content. The developed electronic teaching materials will be tested to determine their validity and feasibility of the developed electronic materials.

2. METHOD

This research is a type of research and development or Research and Development (R&D). Research and Development (R&D) is a type of research to produce a particular product and test the effectiveness of the resulting product. The product developed in this study, namely the development of electronic teaching materials with pictures of building materials for fifth-grade elementary schools. The research development model that will be used in this research is the ADDIE development model (Analyze, Design, Development, Implementation, Evaluation). The main purpose of this development model is to design and develop an effective and efficient product. This model is structured programmatically with systematic sequences of activities to solve learning problems related to learning resources that follow learning needs and characteristics (Tegeh & Jampel, 2017). The analysis stage is carried out through activities such as analyzing existing problems, analyzing the characteristics of students, analyzing the subjects to be studied, analyzing the learning resources used, and analyzing the place of research. At the planning stage, the activities carried out are designing the design of electronic teaching materials and designing product designs. The development stage is to assess the implementation of the activities that have been carried out at the development stage. At the development stage, the necessary data is collected during the development process, making electronic teaching materials with validation by content experts, media experts, and design experts, as well as making revisions or improvements per suggestions and input from content, media, and design experts. The implementation stage is the implementation stage, namely assessing the results of the electronic teaching materials that have been developed. The last stage is the evaluation stage which is carried out at the end of each activity. Figure 1 is a development research procedure using the ADDIE development model.

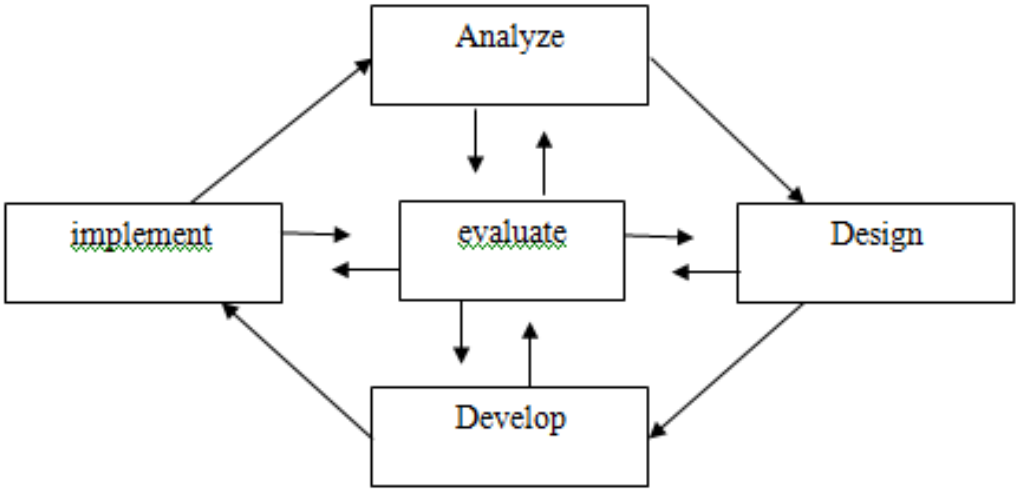

Figure 1. ADDIE Development Research Model (Tegeh & Kirna, 2013)

The subjects in this development research include four lecturers as media and learning design experts and learning materials experts. The four lecturers are divided into two lecturers who have competence in the media and instructional design as media and learning design experts and two lecturers who have competence in mathematics content in elementary schools as learning material experts. This study also involved three teachers who teach in the fifth grade of elementary school. This study also involved students studying in the fifth grade of elementary school as research subjects, divided into nine students as subjects in the individual test, 30 students as subjects in the small group test, and 68 students as subjects in the field test. Data collection methods and techniques in research on developing electronic teaching materials are using a questionnaire. Questionnaires were used to collect data from expert tests and to get the results of teacher and student responses to the developed media. The questionnaires used in this development research include media validity test questionnaires by learning content experts, media validity test questionnaires by media and learning design experts, individual test questionnaires, small group test questionnaires, and field test questionnaires. The five types of questionnaires will previously be tested for the validity of the contents of the instrument. The content validity test of the instrument was carried out by testing the instrument on two judges. The test results from the judges were then analyzed using the Gregory formula. Based on the calculations that have been carried out, all instruments can be declared valid to obtain a coefficient of 0.95. The grid of the instruments used in this study is presented in Table 1.

Table 1. Trial Questionnaire

No.	Evaluation Stage	Aspect
1.	Validity test by learning content expert	Content Eligibility language Presentation
2.	Validity test by media and instructional design experts	Display of illustrated electronic teaching materials. Steps for using electronic teaching materials. Learning model. Evaluation
3.	Individual test	Material presentation. Usage steps. Appearance. Learning
4.	Small group test	Material presentation. Use. Appearance. Learning
5.	Field Test	Learning outcomes Pretest Posttest

The data analysis method in this study was carried out using qualitative and quantitative descriptive analysis. The results of this analysis will later be used to improve or revise the developed electronic teaching materials. Qualitative descriptive analysis is analyzing, describing, and summarizing various conditions and situations from data collected from interviews or observations of the problems studied and those that occur in the field (Agung, 2014). This qualitative descriptive analysis method was used to process data from the reviews of content experts, media and design experts, and responses from individual and small group tests. The descriptive research method with a quantitative approach is used if it aims to describe or explain an event or event in the form of meaningful numbers (Agung, 2014). In this study, the descriptive analysis method with a quantitative approach was used to analyze the results of the validity test, teacher and student responses, and effectiveness tests. The validity test results are analyzed to determine how valid the electronic teaching materials that have been developed and still need to be repaired or revised. The assessment of the expert test will be calculated using the Gregory Formula. In addition, the products developed were also carried out by individual trials and small group trials. Validation of individual trials and small group trials were validated in fifth graders who received mathematics subjects in spatial building materials. This validation will be carried out by distributing questionnaires. The formula used is to calculate the percentage of each subject and the overall percentage.

In this development, tests were also conducted to obtain response data from teachers and students to the developed media. The method of analyzing the response data of teachers and students is based on the class average ($\bar{x}$) of the responses of teachers and students. The mean formula calculated the class average of the teacher and student response scores. In this study, the product was also tested to measure the effectiveness of the product being developed. The effectiveness of electronic teaching materials can be seen from the results of field tests. In addition, the pretest and posttest in learning will provide an overview of improving student learning outcomes after using electronic teaching materials. In this effectiveness test, the researcher performs calculations using the N-gain calculation. Gain is an increase in the ability of students that occurs after learning activities. The gain calculation is obtained from the difference between the pretest and posttest. The effectiveness test (gain normality) aims to avoid bias in the study's results and avoid errors in interpreting the gain. The normalized score will show the level of treatment effectiveness from the score or posttest. Scores of student learning outcomes will also be calculated n-gain index. It is done to avoid research bias caused by differences in the gain index due to different pretest values.

3. RESULT AND DISCUSSION

Result

At the analysis stage, an analysis of the characteristics of students is carried out, an analysis of the research site, an analysis of learning resources, and an analysis of subjects. At the stage of analyzing the characteristics of students, the results showed that it was known that in the learning process, students still did not understand the material for building spaces in mathematics, with inadequate teaching

materials and the absence of development of electronic teaching materials with pictures of building materials for fifth-grade elementary schools. The results obtained in the analysis of the research location showed that the learning process was carried out in the classroom. However, due to the COVID-19 pandemic, the learning process is carried out in two stages: Distance Learning and Face-to-face Learning. Analysis of learning resources is known that the use of media has not been maximized in the learning process. The learning resources used in the learning process are still in the form of textbooks. At this stage, subject analysis is also carried out by determining Core Competencies, Basic Competencies, Competency Achievement Indicators, and spatial building materials developed in electronic teaching materials. Determination of Basic Competencies, Competency Achievement Indicators, and learning materials are presented in Table 2.

Table 2. Basic Competencies, Competency Achievement Indicators, and learning materials

Basic Competencies		Competency Achievement Indicators	learning materials
3.5	Explain and determine the volume of a building using volume units.	3.5.1 Understanding the unit volume of Cubes and Blocks 3.5.2 Understanding the unit volume conversion of Cubes and Blocks	– Definition of Cube and Block. – Cube and Block Formula.
4.5.5	Solve problems related to the volume of geometric figures using volume units.	4.5.1 Solve problems related to the volume of geometric figures using volume units.	– The volume of Cubes and Blocks

In the design phase, the researchers designed the electronic teaching materials that were tailored to the needs of the results at the analysis stage. At this stage, the activities design electronic teaching materials following Basic Competencies, indicators, and learning objectives. At this stage, the design is also carried out. In addition, at this stage, it can be re-designed if there are still discrepancies in the design of electronic teaching materials. The results of the development of electronic teaching materials are presented in Figure 2, Figure 3, Figure 4, Figure 5, Figure 6, and Figure 7.

The development stage (Development) is to develop learning media for electronic teaching materials based on the designs carried out at the Design stage. At this stage, it begins by conducting a validity test on the instrument used in this study. The tests that have been carried out show that the five instruments have valid validity results, and the percentage is very positive. The next stage is to test the validity of the products developed in this study which are tested by learning content experts and media and learning design experts. The assessment of the learning content expert test obtained a coefficient of 0.90, which means that the development of electronic teaching materials illustrated in class V has a "Very High" validity, so it is very valid and feasible. The results obtained by the media and design expert test obtained a coefficient of 0.95 which means that the development of electronic teaching materials with pictures of class V building materials has a "Very High" validity.

In the implementation phase, individual trials, small group trials, teacher responses, student responses, field tests, and effectiveness tests were carried out. The test aims to determine the feasibility level of the developed electronic teaching materials and to become an evaluation material for improving electronic teaching materials. The results obtained in the individual trial get the "Very Good" category with an overall percentage of 91.88%. The recapitulation of the calculation of the small group trial questionnaire results shows that electronic teaching materials get the "Very Good" category, with an overall percentage reaching 94.53%—the teacher response test questionnaire results with an overall average of 44. The results are included in the "Very Positive" category if categorized into a response classification conversion table. The results of the student response questionnaire obtained an average score of 56.56, including the "Very Positive" qualification range. The overall results are included in the "Very Positive" category if categorized into a classification conversion table. The results in the pretest and posttest obtained an average percentage increase in value of 0.713, so the level of increase in posttest results entered the "High" criteria. At the evaluation stage, evaluation is carried out during the analysis, design, development, and implementation stages. The evaluation stage is the final stage of the ADDIE model.

Figure 2. Cover View

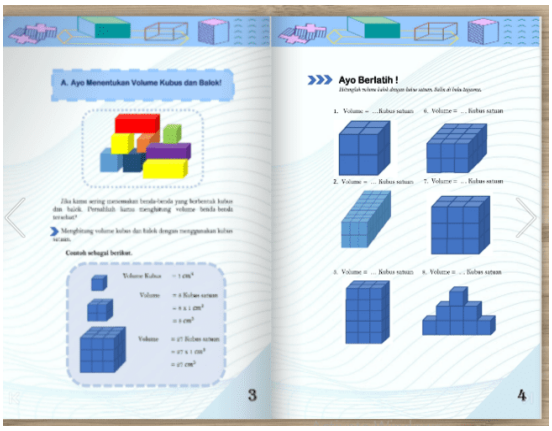

Figure 5. Display of Practice Questions

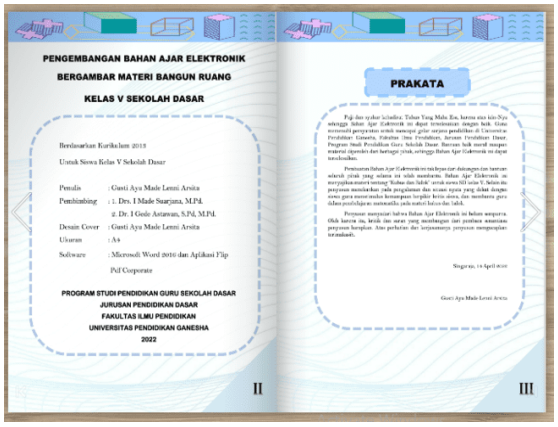

Figure 3. Identity of Teaching Materials

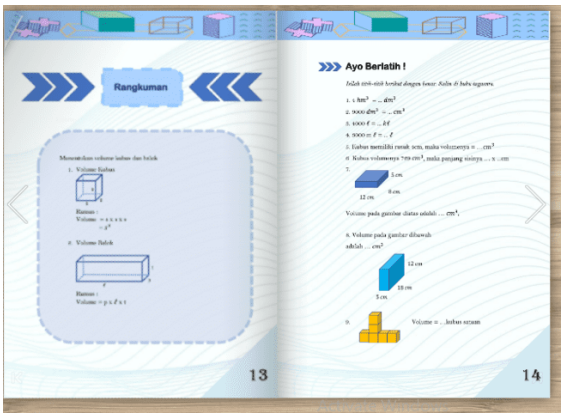

Figure 6. Summary View

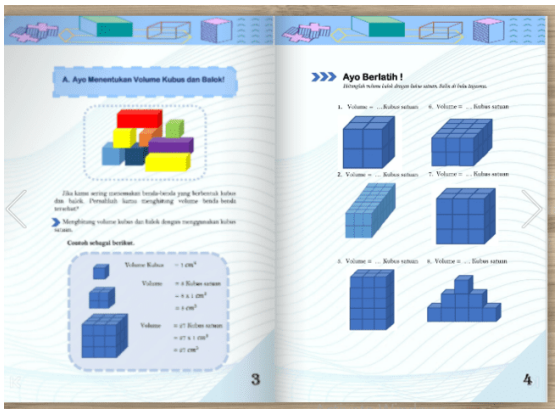

Figure 4. Material Display

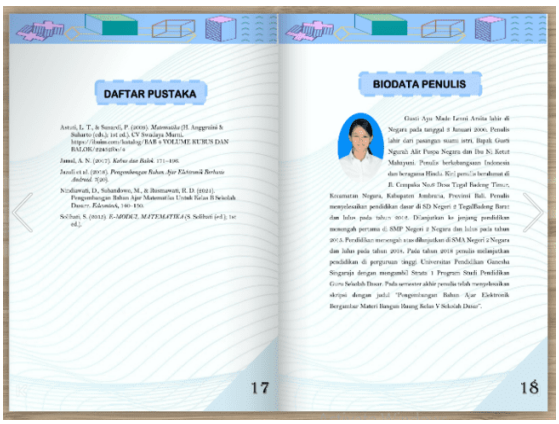

Figure 7. Display of Bibliography and Biodata

Discussion

This development research produces electronic teaching materials with pictures of fifth-grade elementary school building materials. The electronic teaching materials produced in this study are different from other electronic teaching materials. In this study, the material taken was the construction of a fifth-grade elementary school room. The update of this teaching material is an electronic teaching material that was developed containing text and images and using the Flip PDF Corporate application along with practice questions in the electronic teaching materials. This study uses the ADDIE model, which has five stages, analysis, design, development, implementation, and evaluation. Electronic teaching materials with pictures of fifth-grade elementary school building materials are declared valid, feasible, and effective for use in learning. Electronic teaching materials with pictures of fifth-grade classroom building materials deserve to be seen from several aspects. First, the aspect of needs is known that students find it difficult to understand the learning material due to the lack of availability of learning

resources. The availability of adequate learning resources is very important because good learning resources will increase the learning productivity of both educators and students, motivation and interest in learning, and maximum learning mastery. After all, it focuses on individual learning, systematic learning management, and the use and utilization of multimedia in learning. learning (Samsinar, 2019; Subiyakto & Mutiani, 2019). In addition, learning resources are needed by students because good learning resources will make it easier for students to understand learning materials well (Ghofur & Wahjoedi, 2018; Samsinar, 2019). At this analysis stage, it is also known that the implementation of learning that the school is currently carrying out is direct learning and distance learning. The implementation of learning with these two stages makes teachers have to be more creative. It is because the teacher must be able to create a learning process that has the same outcomes both in direct and online learning (Atiya et al., 2021; Nurohmah et al., 2018). The analysis phase is also carried out on the analysis of learning resources. From the results of the research that has been done, it is known that the learning resources that teachers use in the learning process are still limited to textbooks. The learning process that only uses books in the learning process will cause the material in learning to be limited (Handayani & Subakti, 2021; Sakiah & Effendi, 2021). In addition, the use of textbooks only in the learning process will cause difficulties for students in understanding the learning material being studied (Bhakti & Dwi Astuti, 2018; Nuzulia, 2017).

In both aspects of design, the product developed in this study was developed into a product that can be accessed online. The design will make the product easy to use online and direct learning. The product design will also make it easy for students to understand the learning material because students can access it anytime and anywhere (Swara et al., 2020). In addition, the product is also designed to provide practice questions that students can do. The existence of practice questions will make it easier for teachers to measure the success of the learning process that has been carried out using the developed product. The existence of practice questions will also be able to assist students in measuring their level of understanding of the learning material. The products developed are also designed using attractive pictures. Using interesting pictures will attract students' interest in participating in learning (Gusweri & Sari, 2020; Utami, 2018). Images with bright colors are in great demand by students, especially elementary school students (Hoinbala, 2022; Utami, 2018). Therefore, with a design using images with attractive colors, it is believed that the products developed can attract students' interest easily.

Third, the product's feasibility is the first aspect of the product design. The product is also designed to provide practice questions that students can do. The existence of practice questions will make it easier for teachers to measure the success of the learning process that has been carried out using the developed product (Laili et al., 2019; Tamu et al., 2020). The existence of practice questions will also assist students in measuring their level of understanding of the learning material (Setyowati et al., 2020; Winarni et al., 2020). The products developed are also designed using attractive pictures. Using interesting pictures will attract students' interest in participating in learning (Fitri & Ardipal, 2021; Gusweri & Sari, 2020). Images with bright colors are in great demand by students, especially elementary school students (Hoinbala, 2022; Utami, 2018). Therefore, with a design using images with attractive colors, it is believed that the products developed can attract students' interest easily. The feasibility aspect of the product developed can be seen from the aspect of conformity with the characteristics of students. The products developed are adapted to the characteristics of elementary school students still in the concrete operational stage. Students at the concrete operational stage still struggle to understand abstract material because students at this stage can only understand concrete material (Anditiasari & Dewi, 2021; Rahmaniar et al., 2022). Therefore, it is very necessary to have learning media that is needed to help students understand abstract material (Simanjutak et al., 2021; Susanah et al., 2020). The developed product can be very helpful in explaining abstract material.

The product developed has very good effectiveness in improving student learning outcomes. An increase in learning outcomes indicates a successful learning process. This finding is reinforced by previous studies stating that the electronic teaching materials based on flip books developed are feasible and effective in improving learning outcomes (Noviyanita, 2019; Yulaika et al., 2020). In addition, teaching materials have also succeeded in increasing student activities in visual, oral, listening, writing, and emotional activities (Muga & D.N.L., 2017; Riwu et al., 2018; Yulaika et al., 2020). The developed electronic teaching material media is suitable for use in the learning process (Seso et al., 2019; Yulaika et al., 2020). The research in this study implies that with the development of electronic teaching materials with pictures of fifth-grade elementary school classroom building materials, they can get the "Very Good" qualification. So that electronic teaching materials are feasible for teachers to use in the learning process. Electronic teaching materials can also help students to understand learning materials. With these electronic teaching materials, it is hoped that they can facilitate students in Gugus IV in the Kecamatan Negara in learning and motivate them to study independently so that learning objectives can be achieved in Face-to-face Learning and Distance Learning. The limitation of this study is that electronic teaching

materials can only be accessed via the internet. If used in learning, the electronic teaching materials can be accessed via the web, then the link to the electronic teaching materials is shared with students. During this pandemic, educators should be able to develop their creativity by utilizing electronic teaching materials. Be it online or offline training. The goal is to improve the quality of teachers in dealing with Distance Learning as an effort to utilize digital training during this pandemic.

4. CONCLUSION

The product produced in this study is an illustrated electronic teaching material for fifth-grade elementary school classroom construction material that has been declared valid, feasible, and effective for learning. The product developed in this study is suitable for face-to-face and distance learning because it makes it easier for teachers to find other references and helps students. After all, students can access products anytime and anywhere. In addition, the product developed is also effectively used in the learning process because the student's learning process will be more meaningful. After all, this product will provide material and practice questions to help students understand the learning material again.

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