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THE DEVELOPMENT OF PRISM AND PYRAMID TEACHING MATERIAL ASSISTED BY CONSTRUCT 2 SOFTWARE

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ABSTRACT

The aim of the research is to develop teaching materials assisted by media construct 2 software that are practical and appropriate for use in the learning process. The research method used is Research and Development (R&D) using the ADDIE model. The research was conducted at SMPN 3 Rancabali with 12 class VIII students at Rancabali 3 Middle School for limited trials and 9 students at SMPN 2 Rancabali and 9 students at SMPN 1 Rancabali Public for a wider trial and 27 VIII C class students as an experimental class and 27 class VIII A students as the control class for product trials. The validators consist of ICT experts, subject matter experts and teachers. The data collection technique was in the form of a response questionnaire from students and teachers. The research results of the products developed were in accordance with the ADDIE research method with product feasibility categories based on ICT expert validation of 81.25%, material experts 85% and teachers 88% are all included in the very decent category. Products that have been validated are then tested on students through limited trials, wider trials and product trials and students are given practicality questionnaires with a final average result of 83.56% included in the very practical category. Based on the validation results of ICT experts, material experts and student and teacher responses, it was concluded that the teaching materials assisted by the media construct 2 software are valid and appropriate for use in learning. For further research, the researcher hopes to be able to develop teaching materials better according to the suggestions from the respondents.

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INTRODUCTION

Mathematics plays an important role as the basis of knowledge in other fields of science. In everyday life humans need calculations in various fields of work. In every school there is always a math subject. According to (Meylinda & Surya, 2017) that at every school level math must be taught. Although many students say math is a scary subject and they are reluctant to learn math. In line with the opinion (Nabila et al., n.d.) that students think that

math is a difficult lesson to understand with many concepts and formulas. This has an impact on students' interest and motivation to learn mathematics lessons to be reduced or even absent. This is clearly seen during learning many students are not focused, and are not eager to learn.

With the increasingly sophisticated technology that plays an important role in various perspectives of life, of course it also plays an important role in the world of education. According to (Anggraeni et al., 2020; Hendriana & Kadarisma, 2019) that education is declared good if it is in line with the learning objectives achieved by students so that what the teacher says can be understood thoroughly by students. In order for the delivery of material in the learning process to go well, good teaching methods should be used by using well-prepared teaching materials so that students can learn enthusiastically. In teaching materials, learning media should also be used, which of course is assisted by ICT to keep up with technological changes so that students are interested and motivated to learn mathematics.

With the existence of learning media, it is expected to be able to improve students' concept understanding in learning mathematics. According to (Darma et al., 2020; Anggraeni et al., 2021) that psychologically learning media can support students' mental development. A learning environment that is different from habits will make it easier for students to learn. And the media can also show something abstract to be real. Learning media can also add new knowledge for students so that they will see, imitate and then modify their vision based on their learning experience.

Based on interviews with teachers and students at SMPN 3 Rancabali, it was found that the teacher had difficulties in making interesting learning media regarding flat sided space. Students also feel the need for interesting learning media. It's like watching together but about learning to build a flat sided space.

Flat-sided space material is material that requires a high level of concentration in mastering the concept. Students are expected to be able to recognize the elements in flat-sided space and then determine the surface area and volume. BRSD material needs to be presented in good media so that students are able to express things that are concrete to abstract. They must first recognize BRSD then present it in a sketch and certain formulas.

Based on this explanation, teachers as teachers are expected to be able to keep up with the changing times that are turning to technology, so that they do not only teach using the blackboard. Teachers are required to be critical and creative in finding and designing learning media (Hidayat & Sariningsih, 2018).

The learning media innovation that can be used is software construct 2. Which is software that is commonly used in gaming but can also be used in learning mathematics, especially flat-sided space building material.

According to (Audie, 2019) that the role of media is very important in learning, because in addition to making it easier for teachers to deliver material, it also makes students play an active role in learning. They will work together with the group happily and responsibly. Learning media is a major topic in learning materials, especially mathematics. Therefore, researchers try to develop learning media assisted by construct 2 software on the material of flat-sided prisms and pyramids.

METHOD

The method used in this research is Research and Development (R&D) with the ADDIE method (Analysis, Design, Develop, Implementation and Evaluation). The flow of the ADDIE model is presented in the following figure.

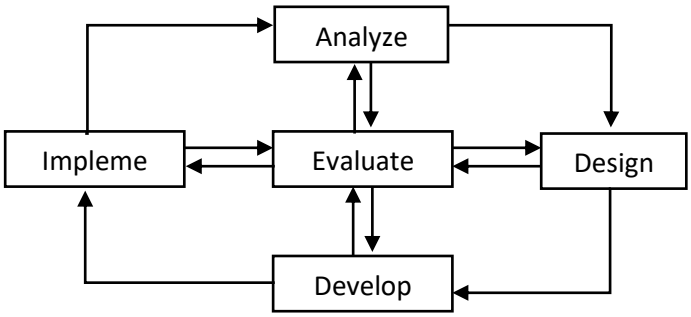

Figure 1. ADDIE development model. Source: Mulyatingsih (Nabila et al., n.d.)

Analysis stage, where researchers conduct a preliminary study by looking at KI, KD in the curriculum used at school, looking at the characteristics of students, and the condition of the school environment. At this stage, researchers also interviewed teachers about what media was commonly used and asked if there was a new learning media whether it could be well received. Then the researcher determines the indicators and objectives of the basic competencies presented.

At the design stage, researchers used construct 2 software and then collected the media materials used, namely in the form of photographs relevant to the flat-sided space of prisms and pyramids associated with the environment so that the images could be more recognizable to students. The media photos were designed and inputted into the construct 2 software.

At the Develop stage, the images that have been collected are adjusted to the needs then entered in the construct 2 software and developed according to the learning objectives.

In the media development stage, the media that has been developed is then shown to ICT expert validators, material experts and teachers as practitioners. If there is a revision, the media is improved but if there is no revision then the media is feasible to be tested on students in limited, broad trials and product tests.

At the implementation or implementation stage, the media design is tested in the classroom in the learning process then students after completing the lesson are given a practicality response questionnaire and also an interview sheet to find out the advantages and disadvantages of the media from the views of students and teachers.

In the final stage, namely evaluation, input and criticism from teachers and students are used as a means of improvement in improving the development of the media used so that it is better and more useful for students and teachers in improving the quality of learning.

The research was conducted at SMPN 3 Rancabali as a limited trial with 12 students from class VIII, 9 students from SMPN 1 Rancabali and 9 students from SMPN 2 Rancabali on a wider trial, as well as 21 students from class VIII A as a control and 27 students from class VIII C as an experimental class from SMPN 3 Rancabali.

Validation data was calculated using the formula

$$Vah = \frac{Tse}{Tsh} \times 100\%$$

With the following criteria. (Saputro & Lumbantoruan, 2020)

Table 1. Validation Criteria

Value	Criteria
81% < p ≤100%	Very Practical
61% < p ≤ 80%	Practical
41% < p ≤ 60%	Practical Enough
21% < p ≤ 40%	Less Practical
p ≤ 20%	Not Practical

Student response data was calculated with the following formula:

$P = \frac{\Sigma f}{N}$ x 100%

With the following criteria:

Table 2. Product Practicality Criteria

Value	Criteria
81% < p ≤100%	Very Practical
61% < p ≤ 80%	Practical
41% < p ≤ 60%	Practical Enough
21% < p ≤ 40%	Less Practical
p ≤ 20%	Not Practical

RESULTS AND DISCUSSION

Results

The research objective is to produce media using construct 2 software on the material of flat-sided prism and pyramid. The media was developed to facilitate students in finding the concept of flat-sided prism and pyramid. The media is designed and then validated to produce a product that is suitable for use by students and teachers according to the stages of the ADDIE method.

The initial step is to analyze the curriculum, student characteristics and the school environment, then the media is designed as shown below. Media links: https://teknik-unjani.com/prisma/ and https://teknik-unjani.com/limas/

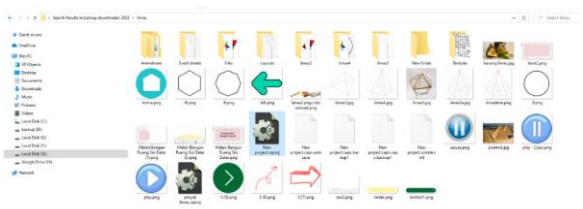

Figure 2. Media collection

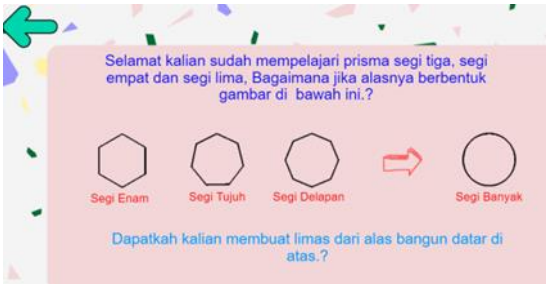

Figure 3. Evaluation view

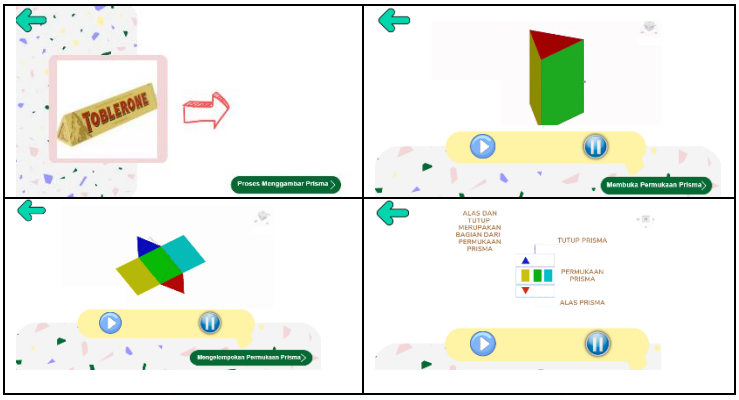

Figure 4. Initial media display

After developing the teaching materials, they were validated by material experts, ICT experts, and teacher practitioners with the following results.

Table 3. Material Expert Validation Results

Category	Percentage	Interpretation
Quality and completeness of materials and questions in teaching materials	83%	Very Valid
Effective and efficient in learning	82%	
Suitability of teaching materials with related elements	88%	
Accessibility, convenience	84%	
Average	**85%**	

The results of material expert validation based on indicators obtained that the quality and completeness indicators on the material and questions in teaching materials obtained a percentage of 83%, effective and efficient indicators in learning a percentage of 82%, indicators The suitability of teaching materials with related elements is 88% and indicators Accessibility, ease of percentage of 84% so that the overall average indicator is 85%. Based on the results of the validator's assessment, student worksheets teaching materials are suitable for use without revision.

Table 4. ICT Expert Validation Results

Category	Percentage	Interpretation
Suitability of Teaching Materials with Didactic Requirements / Feasibility of Content Presentation	83,75	Very Valid
Suitability of Teaching Materials with Construct Requirements	85,00	
Suitability of Teaching Materials with Technical Requirements / Graphics	81,67	
Interactivity of Teaching Materials	81,25	
Average	**82,92%**	

Based on table 4 on each category of assessment from the ICT expert validator, it is found that the category of suitability of teaching materials with didactical requirements / feasibility of content presentation obtained a percentage of 83.75%, the indicator of the suitability of teaching materials with didactical requirements obtained a percentage of 85.00%, the indicator of the suitability of teaching materials with technical / graphical requirements of 81.67% and the indicator of the liveliness of teaching materials of 81.25% with an overall average value of 82.92%. Based on the assessment of the ICT expert validator, it is declared very valid and suitable for use as a teaching material development in learning without revision. There is input to include audio in each activity but it is currently difficult to do in the software in the future further development will be carried out regarding the construct 2 software media.

Table 5. Teacher Validation Results

Category	Percentage	Interpretation
Quality and completeness of materials and questions in teaching materials	88%	Very Valid
Effective and efficient in learning	90%	
Suitability of teaching materials with related elements	87%	
Accessibility and ease of use and management	88%	
Average	88%	

Based on table 5 of the recapitulation of the material expert validation assessment results from practitioners / teachers on each indicator, that the quality and completeness indicators on the material and questions in the teaching materials obtained a presentation of 88%. Effective and efficient indicators in learning obtained a presentation of 90%. Indicators of suitability of teaching materials with related elements obtained a presentation of 87% and indicators of accessibility and ease of use and management obtained a presentation of 88%. With an average assessment of 88% based on the validation interview of practicing material experts or teachers, the product is declared valid and suitable for use as a teaching material development in learning without revision.

After the validation process is complete, the product is tested on students and after the learning is complete students are given a response questionnaire to determine the criteria for the practicality of the product used in learning activities. The following is a recapitulation of the results of student practicality indicators on the products used.

Table 6. Recapitulation results of each indicator of student practicality

Category	Percentage	Criteria
Usability	79,74%	Very Practical
Ease of	80,22%	
Helpfulness	86,67%	
Attractiveness	87,34%	
Average	83,49%	

Based on the results of students' responses to the practicality of teaching materials in the recapitulation of table 6, it is obtained that the usefulness aspect with an average percentage of 79.74% indicates that this teaching material can be useful for students in learning activities, students get more in-depth knowledge about flat-sided space building material presented in teaching materials, thus providing opportunities for them to learn in groups. In the aspect of convenience, the percentage obtained is 80.22%, indicating that teaching materials are easily accessible to students. In the assistance indicator, the percentage of 86.67% shows that students are helped by teaching materials to learn collaboratively. And the attractiveness indicator gets a percentage of 87.34 indicating that students are very interested in the media and teaching materials used in learning.

Of the four indicators, the average percentage obtained was 84.49% with a very practical interpretation, meaning that teaching materials assisted by construct 2 media software can be useful for learning activities, making it easy and practical to implement.

At the evaluation stage, a review of the assessment that has been carried out by material experts, ICT experts, practitioners/teachers and also student responses is carried out. Based on the evaluation that has been done on the learning media software construct 2, several inputs were found including audio that needs to be added, the material used in the learning video should be added again by calculating the surface area and volume. This is an improvement for researchers in the next development.

Discussions

From the results of the research, a teaching media product was created using construct 2 software on the material of flat-sided spaces of prisms and pyramids. The fundamental thing in teaching material development research is to create student interest and motivation to learn. (Magdalena, 2021) that Learning media is designed so that students become interested and learning is not boring (Wangge, 2020).

The material presented in the media is only prisms and pyramids, because cubes and blocks are already included in rectangular prisms, if students are critical they will find that cubes are regular rectangular prisms with all ribs the same length. And blocks are also regular rectangular prisms. In this media development, students are guided to understand and recognize the elements of flat-sided prisms and pyramids. According to (Chintia et al., 2021; Zalzabilla Aljabar et al., n.d.)that students have difficulty recognizing the elements of BRSD and have difficulty presenting BRSD sketches from story problems.

Based on the results of the assessment from the experts, the media is suitable for use in the learning process. It is hoped that the learning media will be able to improve students' mathematical abilities and mathematical thinking habits. From the results of student responses, the teaching media is very positive and practical and feasible to use. Even students expect that other materials can use similar learning media. The use of learning media is expected to form an exciting learning environment (Nabila et al., n.d.). Learning design also affects learning activities so as to get better results (Dewi & Afriansyah, 2022; Komariah et al., 2018).

CONCLUSION

The process of developing construct 2 media software is carried out through 5 stages of ADDIE, namely analysis, design, development, implementation and evaluation. The development of teaching materials assisted by construct 2 software shows very valid results and is feasible to use and also gets very practical criteria based on the results of student

responses. Researchers hope that the development of teaching materials assisted by construct 2 software media can be further developed so that it can be better in terms of appearance and audio. The development of software construct 2 media also needs to be associated with students' mathematical thinking skills. can it improve students' cognitive and affective abilities? Hopefully, further research can be done.

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