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DEVELOPMENT OF LEARNING MEDIA WITH GEOGEBRA TO INCREASE STUDENTS LEARNING INTEREST ON FLAT-SIDED BUILDING MATERIALS

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Abstract

GeoGebra is mathematics software that is packaged practically and is easy to use for learning and teaching at all levels of education. This research aims to determine the results of developing valid, practical and effective GeoGebra media on flat-sided geometric materials. This research was conducted at SDN Tukangan Yogyakarta. This research uses Research and Development procedures with the ADDIE development model of Analysis, Design, Development, Implementation, and Evaluation. The sampling technique used was purposive sampling. The subjects of this research were teachers and 27 class VI students. The data collection technique used was a questionnaire. The data collection instruments include material validation questionnaires, media validation questionnaires, practicality test questionnaires, and effectiveness test questionnaires. The data analysis technique uses descriptive analysis techniques, namely describing the data that has been collected. Research results: Validity tests carried out by media and materials experts produced scores of 2.4 and 2.8, both considered sufficient, so revisions were necessary. Furthermore, the revised GeoGebra learning media was tested individually, obtaining scores of 3.7 (very good) and 2.7 (fair) for 5 students and teachers. Field trials carried out by teachers and class VI students resulted in scores of 3.1 and 2.9, considered good in practice. Furthermore, the interest in learning questionnaire showed an increase from 45% to 69% in respondents who were classified as having good interest after using the media. In this way, GeoGebra learning media is validated, practical and effective.

Keywords: Development; GeoGebra; Learning Interest.

Abstrak

GeoGebra adalah software matematika yang dikemas praktis dan mudah digunakan untuk pembelajaran dan pengajaran pada seluruh jenjang pendidikan. Tujuan dari penelitian ini adalah mengetahui hasil pengembangan media GeoGebra yang valid, praktis dan efektif pada material geometri sisi datar. Penelitian ini dilakukan di SDN Tukangan Yogyakarta. Penelitian ini menggunakan prosedur Research and Development dengan model pengembangan ADDIE yang terdiri dari Analysis, Design, Development, Implementation, dan Evaluation. Teknik pengambilan sampel yang digunakan adalah purposive sampling. Subjek penelitian ini adalah guru dan 27 siswa kelas VI.. Teknik pengumpulan data yang digunakan berupa angket. Adapun intrumen pengumpulan data meliputi angket validasi materi, angket validasi media, angket uji kepraktisan, dan angket uji keefektifan. Teknik analisis data menggunakan teknik analisis deskriptif yaitu mendeskripsikan data yang telah dikumpulkan. Hasil penelitian Uji validitas yang dilakukan oleh ahli media dan materi menghasilkan skor 2,4 dan 2,8 keduanya dinilai cukup sehingga perlu dilakukan revisi. Selanjutnya media pembelajaran GeoGebra hasil revisi diujikan secara individu, diperoleh nilai 3,7 (sangat baik) dan 2,7 (cukup) kepada 5 orang siswa dan guru. Uji coba lapangan yang dilakukan guru dan siswa kelas VI menghasilkan skor 3,1 dan 2,9, keduanya tergolong baik dari segi praktik. Selanjutnya angket minat belajar menunjukkan adanya peningkatan dari 45% menjadi 69% pada responden yang tergolong memiliki minat baik setelah menggunakan media. Dengan demikian, media pembelajaran GeoGebra tervalidasi, praktis, dan efektif.

***Kata kunci**: GeoGebra; Minat Belajar; Pengembangan.*

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INTRODUCTION

Computer technology is a growing field of study that teachers can use to help students learn. There are many different programs that can be found on computers, and these programs can be used to help students learn (Gina, 2023). This is because most of the time, the teacher is the one teaching and the students just listen. This way of learning is very ineffective because it does not allow students to learn optimally (Lainufar et al., 2021).

The curriculum can help solve this problem by providing clear instructions to students about what they need to learn. The tendency of teachers to control activities in the teaching and learning process results in a lack of interest in learning on the part of students. The benefits of the media, one of which is to attract attention to stimulate interest in learning and using the media will provide a variety of teaching methods. Considering the benefits of using media, so that learning runs effectively and efficiently, teachers should use learning media that are interesting, easy to remember and supported by a conducive learning environment.

This will help students to be interested in learning, and students will be better able to understand and realize learning objectives. The 2013 curriculum uses a student-centered approach that helps students learn effectively (Rahmad et al., 2019). In fact, many students find it difficult to understand geometry, even though it is an important subject. The experience of researchers in tutoring has found that when students face difficult geometry problems, they lose interest in learning (Febriana et al., 2020).

The initial information collection was carried out at SDN Tukangan Yogyakarta with observations on February 19 2023, based on observations, it seems that students' interest in learning is still low. The results of observations seen from the behavior of students as in the learning process. Students tend not to pay attention, some are daydreaming, and chatting with friends. When the teacher asks a question, students tend to just be silent, answer carelessly or wait for a friend to answer.

Many students don't do homework if they don't have collect it (Muhammad Isna Rosyada & Wibowo, 2023). Teachers don't use much learning media that use computer programs such as GeoGebra, Maple etc. which support the learning process only limited to Power Point. The teacher gave answers regarding the media using computer programs to attract students to study with the consideration that children now always hold devices (M I Rosyada et al., 2021). Based on observations and interview results, it is necessary to develop learning media with computer programs.

Learning media is a series of activities used to create a learning environment based on existing educational theories. Computer programs are great for doing this because they can be very accurate, fast, and efficient. One of the computer programs is geogebra software. One of the steps to increase students' interest in learning is choosing the right learning media such as GeoGebra (Pakaya & MacHmud, 2021).

Geogebra is a computer program used to help students learn mathematics. It can be very helpful in teaching geometry, as it can be used to illustrate concepts with visual aids. This can help students become more interested in learning these subjects. In line with

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Putro (2016), in his research "Utilization of APBS and GeoGebra to increase students' interest and learning outcomes" states that through the application of the use of APBS and GeoGebra with a scientific approach can increase students' interest in learning class VI SDN Tukangan Yogyakarta in the academic year 2022/2023.

Based on the description of the background, a study was prepared with the title "Development of Learning Media with Geogebra to Increase Student Learning Interest on Flat-Sided Building Materials". This research was conducted with the GeoGebra program so that students can have an interest in learning.

RESEARCH METHOD

This research is a development research, the product being developed is a learning media for flat sided building material with the ADDIE development model. The subjects of the needs analysis as well as the subjects of the product trial were students and teachers of class VI at SDN Tukangan for the 2021/2022 academic year. This study uses the ADDIE development model developed by Dick and Carry. The ADDIE model stands for Analysis, Design, Development, Implementation and Evaluation. The product development model used in this research and development project is more rational and more complete than the 4D model (Suryawan et al., 2021).

This model consists of five steps: Analysis, Design, Development, Implementation, and Evaluation The stages in the ADDIE development model: 1) Analysis: includes competency analysis, student needs analysis, problem analysis and determines the type of media to be used later; 2) Design: creating learning objectives for a subject, then identifying appropriate media learning strategies to help students achieve these goals; 3) Development: designing software is the process of creating a plan or design for an invention or product, and then making it happen using learning multimedia tools; 4) Implementation: at this stage, the learning system is fully developed and working as intended; 5) Evaluation: is a way to measure the success of a learning system by seeing how well the system meets the desired goals.

The technique used in this development research includes the nonprobability sampling technique, namely purposive sampling, namely there are a number of considerations that need to be considered when taking samples (Sugiyono, 2018). The data collection technique is done through interviews and questionnaires. This study uses a type of semi-structured interview. The questionnaire instrument used in this study was using a Likert scale with four multiple choice answer choices.

The data analysis technique used is descriptive analysis technique which is carried out using descriptive statistics. Syahfutra et al., (2020) suggests descriptive statistics are used to describe data in a way that does not imply any conclusions. They can be used to analyze data to understand it better. Stages of descriptive analysis used in research: Change the category value into an assessment score, and find the average value

In the Likert scale that uses 4 values, the ideal maximum score is 4 and the ideal minimum score is 1. Then the table according to Riyadi and Parjono (2014: 170) is obtained on table 1.

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Table 1. Guidelines for interpreting validity tests

Score Interval	Criteria
$3{,}4 < X$	Very Good
$2{,}8 < X \leq 3{,}4$	Good
$2{,}2 < X \leq 2{,}8$	Good Enough
$1{,}6 < X \leq 2{,}2$	Not Good
$X \leq 1{,}6$	Very Not Good

RESULT & DISCUSSION

The use of geogebra for the development of learning media follows the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). Learning media trials (individual tests, field trials) were also carried out to ensure the successful implementation of learning media using GeoGebra.

1. Analysis Phase

a. Analysis of problems and needs

The problem and needs analysis stage conducted interviews with the teacher and one class VI student at SDN Tukangan Yogyakarta. The interview was conducted on February 21, 2023. It was found that teachers rarely used media to deliver material, due to time constraints (there were reductions in class hours). Teachers rely on conventional models which often make students feel bored. The instructional media used by teachers are usually limited to Power Point presentations, due to lack of time to study other computer programs. Interviews with students, learning media made by the teacher, and the way the material is delivered all cause boredom in students. In order to make mathematics learning more interesting, it is necessary to develop media that makes students interested in listening and helps them understand the material (Ganesen et al., 2020; Hobri et al., 2020; Pratama et al., 2022).

b. Competency Analysis

The revised 2017 edition of the 2013 curriculum is the curriculum used in the SDN Tukangan Yogyakarta. The researcher chose the flat sided geometric material because it is a suitable medium for multimedia using the geogebra application which can produce geometric shapes. The core competencies in the 2013 revised 2017 curriculum are skills and knowledge that enable researchers to use these two competencies. Teachers in the 2013 curriculum need to use technology to help them learn, and researchers have developed learning media that use interactive software to attract students' attention. This way of teaching involves students in the learning process and makes the learning process more interesting. The basic competencies used for geometric shapes are 3.9 differentiating and determining surface areas and volumes of shapes and 4.9 solving problems related to surface areas and volumes of flat sides. The indicators used through this basic competence are differentiating the shape of the flat side shapes, determining and calculating the surface area and volume of the flat side shapes, and solving problems related to surface area and volume (Muliyana et al., 2022; Pakaya & MacHmud, 2021; Rhilmanidar et al., 2020; Rionanda et al., 2022).

2. Design Stage

The design phase is the second stage after conducting the analysis phase. The design or planning stage of learning media in the form of multimedia requires an image or sketch to help make the learning media that will be made later. Geogebra is a software application used by researchers to create media.

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a. Flowcharts

Flowcharts in the application are used to display the steps and decisions to carry out a process from a program. Flowcharts can be used in learning media to help describe the steps and decisions made during the activity (Hobri et al., 2020; Ramdan et al., 2018; Syam et al., 2020). This can help make activities run as desired.

b. Storyboards

Storyboards are a way of describing how a learning activity will be carried out, by depicting the steps involved in the activity on a simple visual map. The storyboard is based on the flowchart that has been made, and provides instructions on how to carry out activities when using the media that has been made.

3. Development Stage

This development stage is divided into several things, namely:

a. Making learning media

Geogebra software is used to create learning media that are designed and created by researchers. This material uses teaching materials and books for class VI SD Curriculum 2013, the 2017 revised edition.

b. Validation of the feasibility of learning media products

The learning media that has been made is then tested for its feasibility. This learning media is thoroughly evaluated by experts in the media field to ensure that the media provides useful teaching for students. In addition, suggestions and input are given to help make learning media better. This learning media has also been thoroughly evaluated by material experts to ensure that the media provides useful teaching for students. In addition, suggestions and input are given to help make better.

4. Implementation Stage

The implementation stage is the stage after the development stage is carried out. At this stage, the revised geogebra learning media is tested first in small groups (individual test) with the aim of learning media legibility and its use. GeoGebra learning media is implemented in real classroom situations through field trials that aim to get a practicality score of the GeoGebra learning media is obtained on table 2.

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Table 2. Summary of the distribution of the frequency of student field trial assessments

Score	Frequency	Percentage
37	1	3,7%
38	4	14,8%
39	1	3,7%
40	5	18,5%
41	5	18,5%
42	4	14,8%
43	3	11,1 %
44	2	7,4%
45	1	3,7%
47	1	3,7%
Total	**27**	**100%**

The results of the field trial questionnaire from the teacher obtained a total score of 50 with an average of 3.1 then converted in table 3.13 obtained good criteria. The results of the field trial questionnaire from students had an average of 2.9 then converted in table 3.13 obtained good criteria, so from the results of the questionnaire from the teacher it was obtained the practicality test of Geogebra learning media with good criteria and the results of the questionnaire from students obtained the practicality test of Geogebra learning media sufficient criteria.

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5. Evaluation Stage

The evaluation stage is the last step in the geogebra media evaluation process. This stage uses a learning interest questionnaire to measure how much interest students have in using GeoGebra media (Aprillia & Zainil, 2020; Suryawan & Permana, 2020). This questionnaire was filled in by students who previously used Geogebra media, so that it can be seen how much interest students have in using GeoGebra media. The results of the interest in learning questionnaire is obtained on table 3.

Table 3. Summary of the frequency distribution of the interest in learning questionnaire before using GeoGebra media

Score	Frequency	Percentage
17	2	7,4%
18	4	14,8%
19	8	29,6%
20	4	14,8%
21	4	14,8%
22	3	11,1%
23	1	3,7%
25	1	3,7%
Total	**27**	**100%**

The results of the questionnaire after using geogebra media is obtained on Table 4.

Table 4. Summary of the frequency distribution of the interest in learning questionnaire after using GeoGebra media

Score	Frequency	Percentage
40	2	7,4%
43	3	11,1%
44	1	3,7%
47	2	7,4%
48	2	7,4%
49	2	7,4%
50	1	3,7%
51	3	11,1%
52	3	11,1%
53	2	7,4%
54	1	3,7%
55	2	7,4%
56	1	3,7%
57	1	3,7%
59	1	3,7%
Total	**27**	**100%**

Based on the frequency distribution table of the interest in learning questionnaire, it is known that the interest in learning before using the GeoGebra learning media, 45% is quite good according to table 3.14, whereas after using the GeoGebra learning media this figure increases to 69% which is classified as good according to table 3.14.

The end result of this study is that learning media uses the GeoGebra program and LKPD to support student teaching and learning activities and increase student interest in learning. This media was developed according to the ADDIE development model.

1. The process of developing geogebra learning media

Making geogebra learning media is carried out in several stages: (1) Analysis: conducting interviews with teachers and students to find out the problems that occur, the teacher's habits in conveying material, the facilities and infrastructure owned by the school, teaching and learning activities, and adapting the media to the existing curriculum. used, (2) Design: make flowcharts used to make GeoGebra media, design GeoGebra media and make storyboards according to LKPD, (3) Development: make GeoGebra media, do validation, try GeoGebra media on individual tests conducted by 5 students and the teacher uses a personal laptop/computer and develops GeoGebra media according to the

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suggestions and input provided, (4) Implementation: tries GeoGebra media in class through field trials, (5) Evaluation: After carrying out learning using geogebra, students filled out an interest in learning questionnaire to find out their interest in learning after using geogebra media (Wondo et al., 2020).

2. Results of geogebra media development

Media validity testing was carried out by 2 experts, namely media experts and material experts. Media experts tested the media with content and objective, instructional and technical aspects. From the results of the validity test by media experts, a score of 2.47 was classified as sufficient criteria. The material expert tested the media with the content and learning truth spec. From the results of the validity test by the material expert, a score of 2.8 was obtained which was classified as sufficient criteria. The validation score of this study is lower than previous studies such as the research by (Novilanti & Suripah, 2021; Ratna & Wati, 2022; Rhilmanidar et al., 2020; Sari et al., 2016) due to an error or error in the GeoGebra software when it is run, therefore the researcher uses the GeoGebra class which can be accessed with a browser by students to avoid errors when the program is run without the need to install and open the geogebra program. Geogebra learning media was then tested according to the product trial design

Product trial design consists of two: individual trials and field trials. Individual trials were used to determine the readability of GeoGebra media, individual tests had examiners, namely the mathematics teacher and 5 students with a score of 3.7 each which was classified as very good criteria and 2.7 which was classified as sufficient criteria. Field trials were carried out to find out the practicality of Geogebra media, field trials had testers, namely mathematics teachers and class A students with a score of 3.1 respectively which was classified as good criteria and 2.9 which was classified as good criteria. To test the effectiveness of the media, a class of 27 students was given a learning interest questionnaire before using GeoGebra learning media and after using GeoGebra learning media. The results showed that students' interest in learning increased from 45% to 69%.

The development of Geogebra media is in accordance with the ADDIE development model and from the statement above GeoGebra learning media is said to be valid, practical and effective for increasing students' learning interest. According to Ramli (2012) media can be anything that can convey messages from creator to recipients to get their attention, interest, and stimulate their minds. Kemp and Dayton (1965) suggest that learning media has three main functions for listeners, individuals or small or large groups, the first function is to increase interest, stimulate thought, the second function is to make the media a tool for conveying material in the form of introductory presentation, content and knowledge, the third function is learning media involving students in activities and arranged systematically. Putro (2016) regarding the increase in students' interest in learning after using Geogebra learning media and Aprillia & Zainil (2020) regarding the analysis of students' learning interest in SPLDV material with the help of Geogebra. The results of the study found that the use of geogebra media can increase students' learning interest. This is in accordance

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with the theory and previous research. Based on the results of this study, several theoretical implications were obtained as follows:

a. Development style

The development of geogebra learning media is based on the ADDIE model which includes five stages, namely analysis, design, development, implementation, and evaluation so as to produce learning media using geogebra and LKPD. The results of the study were in the form of geogebra media and LKPD which were validated by 2 experts, namely media experts and material experts who were said to be valid with a score of 2.4 and 2.8, field trials were tested on teachers and 27 students in class VI were said to be practical with a score of 3.1 and 2.9 and tested for effectiveness by 27 class VI students said to be effective with a score of interest in learning before and after using the media 45% to 69% so that the GeoGebra media and LKPD can increase interest in learning

b. Media benefits

The results of this study indicate that students become more interested in learning geometry when using geogebra and LKPD learning media such as drawing nets, looking for volume and surface area on flat sided shapes. This makes students better understand the material.

The research objective of this study was to find out the results of developing geogebra media. The results of the study show that geogebra media can increase students' interest in learning flat sided geometric material. The development of learning media has several practical implications as follows: Learning media can be used to help teachers can use innovation and creativity to develop learning media which will increase students' interest in learning, this can also support the professionalism of a teacher. Teachers can use learning media that use technology to help learn and teach more easily, so that the teaching and learning process is more interesting and involves students. This can help to ensure that material is delivered effectively to learners in a variety of ways. The development of GeoGebra learning media inspires, and innovates learning media that are used to help teachers deliver flat sided geometric material.

Media experts and material experts carried out the validity test with a score of 2.4, classified as sufficient, and a score of 2.8, considered sufficient, so it could be concluded that the media could be tested with revisions. The revised GeoGebra learning media was then tested individually by 5 students and teachers, each of whom received a score of 3.7, which was classified as very good and a score of 2.7, which was classified as sufficient. The practicability test was carried out at the field trial stage by teachers and class VI students, with a score of 3.1, which was classified as good and a score of 2.9, which was also classified as good. The effectiveness of learning media was tested using a learning interest questionnaire before and after use. The questionnaire results showed that 45% of respondents were classified as fair before use, but after use, this figure increased to 69%, which was classified as good.

CONCLUSION AND SUGGESTION

Based on discussions and research results related to Geogebra learning media, the development of Geogebra learning media was based on the ADDIE development model. Research results: Validity tests carried out by

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media and materials experts produced scores of 2.4 and 2.8, both considered sufficient, so revisions were necessary. Furthermore, the revised GeoGebra learning media was tested individually, obtaining scores of 3.7 (very good) and 2.7 (fair) for 5 students and teachers. Field trials carried out by teachers and class VI students resulted in scores of 3.1 and 2.9, considered good in practice. Furthermore, the interest in learning questionnaire showed an increase from 45% to 69% in respondents who were classified as having good interest after using the media. There are several ways that researchers want to describe, including Other researchers are advised to use a wider range of learning media to get better research results. In addition, effectiveness testing in this research is only limited to students' learning interests. Other researchers can test effectiveness with students' cognitive abilities, such as learning outcomes or spatial abilities, to get different results.

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