



Developing Interactive Learning Media of Worksheets based on Geogebra Classroom

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Abstrak: Perkembangan teknologi membuka peluang agar pendidikan terus berkembang, apalagi pada masa pandemi covid-19, pemanfaatan teknologi secara optimal sangatlah diperlukan. Perlunya penyesuaian terhadap LKPD yang merupakan media pembelajaran dan merupakan komponen penting dalam kegiatan belajar mengajar agar sesuai dengan keadaan yang sedang terjadi. Hasil observasi mendapatkan bahwa belum adanya penyesuaian terhadap hal tersebut. Penelitian ini bertujuan untuk mengembangkan LKPD digital yang berbasis geogebra classroom pada materi himpunan khususnya operasi himpunan. Penelitian ini menggunakan metode DDD-E dengan tahap decide, design, develop dan evaluate. Subjek penelitian ini adalah siswa kelas 7D SMP Laboratorium UM sejumlah 32 siswa. Proses uji coba dilakukan pada saat jam pelajaran berlangsung. LKPD digital berbasis geogebra classroom untuk materi operasi himpunan telah selesai dikembangkan. Media pembelajaran yang dikembangkan telah divalidasi dan didapatkan skor hasil validasi media 3,49 dan validasi materi 3,45 yang mengindikasikan bahwa media ini valid. Hasil uji kepraktisan yang didapat dari angket yang dibagikan pada siswa mendapatkan skor 3,24. Sedangkan untuk efektivitas mendapatkan skor 3,25 dan membantu 78% siswa mencapai KKM. Hal ini menunjukkan bahwa media yang dikembangkan praktis dan juga efektif. Berdasarkan hasil validasi, efektivitas dan kepraktisan, LKPD digital berbasis geogebra classroom yang dikembangkan dapat digunakan untuk mempelajari topik operasi himpunan.

Kata kunci: LKPD; geogebra classroom; media pembelajaran; operasi himpunan.

Abstract: *Technological developments open up opportunities for education to continue to develop, especially during the COVID-19 pandemic, optimal use of technology is necessary. The need for adjustments to the LKPD (student worksheet) which is a learning medium and is an important component in teaching and learning activities to suit the current situation. The results of the observations found that there was no adjustment to this matter. This study aims to develop digital worksheets based on the geogebra classroom on set material, especially set operations. This study uses the DDD-E method with the stages of decide, design, develop and evaluate. The subjects of this research were 32 students of class 7D UM Laboratory Junior High School. The trial process is carried out during class. The digital LKPD (student worksheet) based on the geogebra classroom for set material, especially on set operations, has been developed. The developed learning media has been validated and obtained a media validation score of 3.49 and material validation 3.45 which indicates that this media is valid. The results of the practicality test obtained from the questionnaire distributed to students got a score of 3.24. As for the effectiveness of getting a score of 3.25 and help 78% of all students reach a KKM. This shows that the media developed is both practical and effective. Based on the results of validation, effectiveness and practicality, the developed digital worksheet based on the geogebra classroom can be used to study the topic of set operations.*

score of 3.25 and help 78% of all students reach a KKM. This shows that the media developed is both practical and effective. Based on the results of validation, effectiveness and practicality, the developed digital worksheet based on the geogebra classroom can be used to study the topic of set operations. 45 which indicates that this media is valid. The results of the practicality test obtained from the questionnaire distributed to students got a score of 3.24. As for the effectiveness of getting a score of 3.25 and help 78% of all students reach a KKM. This shows that the media developed is both practical and effective. Based on the results of validation, effectiveness and practicality, the developed digital worksheet based on the geogebra classroom can be used to study the topic of set operations.

Keywords: LKPD; geogebra classroom; learning media; set operations.

Introduction

Rapid technological developments affect human life in all aspects, including education. The development of technology and communication provides opportunities for education to continue to grow (Hwang, 2010). To improve the quality of education, adjustments are needed to these technological developments (Tamam & Dasari, 2021). During the pandemic, in particular, in the field of education in accordance with Circular of the Ministry of Education and Culture No. 15 of 2020. The Indonesian government itself has set a policy that learning activities must be carried out from home to break the chain of the spread of the Covid-19 virus, so that in practice, technology is needed to support all online learning activities because this pandemic has drastically changed learning and education (Sipahutar et al., 2021), starting from the use of video conferencing, the form of assignments given, attendance and other things in learning activities

With increasingly difficult conditions related to learning activities, especially in learning mathematics which is generally known to be a difficult subject for students to understand (Lyons & Beilock, 2012). Based on the results of TIMSS (*Trends in International Mathematics and Science Study*) which aims to determine the ability of students in mathematics in several countries, the ability of Indonesian students from 1999 to 2015 is still at a low level (Prastyo, 2020). Based on this, it is still very clear that mathematics is still a difficult problem for students to understand in offline learning activities where teachers and students can interact directly. Whereas mathematics is a very important learning because of its useful function to train students to think logically (Wardono et al., 2016), analytical, systematic, creative and critical, as well as the ability to work together (Rahman et al, 2021). However, in online learning, where everything is done remotely, it takes more effort from educators to deliver material in learning because of the many challenges (Gewertz, 2020) and students who are increasingly disinterested in learning mathematics during online learning (Hima et al., 2021).

In a situation where all activities are held online, of course it is necessary to adjust the learning tools designed by educators, starting from the lesson plans, LKPD, and also the media used so that learning can continue to run well and improve students' abilities (Marbán et al., 2021). In relation to the function of learning media which is an intermediary (Lu'Luilmaknun et al., 2021) and help students see the objects discussed during learning (Masniladevi et al., 2017) and increase student interest in learning (Astuti et al., 2019). The media must be in accordance with the state of teaching and learning activities. According to opinion Widodo & Wahyudin (2018), learning media is a tool used by teachers in conveying messages to students, serves to create learning situations and contains activities. So that the suitability of the media with the learning situation is very important to note.

However, with all the circumstances that occurred, most educators did not make some adjustments in their learning activities. So that there is no difference between activities

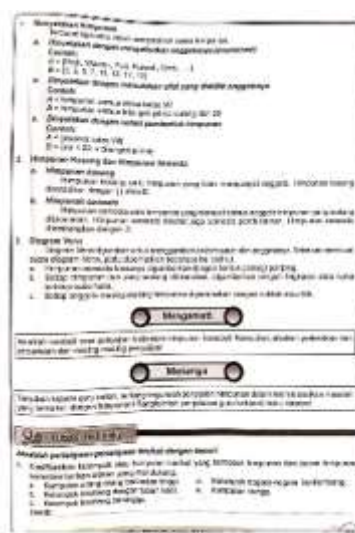
carried out offline and online as well as offline and online, even though the difference between these conditions is very clear. Improvisation of appropriate learning media is very much needed in online learning conditions so that students' abilities can increase (Marbán et al., 2021). In mathematics learning in particular, there is material that requires representation of problems related to geometric drawings and story problems that must be represented in mathematical images or forms (Hussen et al 2021).

Thus, in learning mathematics which has a higher level of difficulty in terms of representation, it requires appropriate media so that the student experience is maximized (Hussen et al., 2021). In addition, to teach abstract concepts in mathematics learning activities must be designed according to these objectives (Qohar et al, 2021). In this case, technology is needed to support this, because the pedagogical aspects that support the effective use of technology will lead to motivation, collaboration, and authentic learning activities and can improve the student learning experience (Yates et al. 2021). The use of technology in learning has been proven to improve students' mathematical abilities ranging from simple to critical thinking skills (Mahayukti, 2018).

This problem also occurs in the UM Laboratory Junior High School, the learning media, especially the LKPD used is still the same as the LKPD used in offline learning and has not taken advantage of technological developments. Below is an example of the LKPD used.



Picture 1 LKPD used in class



Picture 2 LKPD used in class

LKPD like the picture above can still be used, but as explained earlier, it is very important to do the appropriateness of learning media with online learning activities so that learning activities can be maximized. The worksheets are less interactive because students cannot make modifications to the visualization of existing images. In addition, the LKPD is still paper-based and in online learning activities like this it is less efficient to use because students need to take photos of their work so that the teacher can make an assessment.

The urgency of the LKPD as one of the media that is the core of learning activities, so that a good and appropriate LKPD will affect learning in the classroom because LKPD is a learning device or media that serves to help students and teachers to create effective interactions in the learning process (Ahmad et al. 2021). Especially on set material which is one of the most important topics in mathematics (Olenev et al., 2020) and really need a good mathematical representation, a correct demonstration in drawing the set region. In addition, the set is a basic and essential material that must be understood by students because it will

be used and is indispensable for studying other materials in the future such as relation material, functions and others.

To overcome these problems, LKPD is needed that is in accordance with online and offline learning activities and provides activities that support student knowledge during online and offline learning. Because the benefits of LKPD are very many in learning activities, starting from helping the formation of concepts, increasing the ability of students to find and develop processes (Ahmad et al. 2021), as a guide in the teaching and learning process, a means of independent learning for students in understanding assignments (Basuki & Wijaya, 2019) and add more information about concepts and train critical thinking (Krisdiana et al., 2019).

The solution to solve these problems is to use digital LKPD media that can be accessed by students anywhere and anytime via their smartphone or laptop. This is very much in line with the situation of online and offline learning that is being held in schools. In addition, this digital LKPD can also be used in offline learning.

LKPD is a form of student worksheet which will later be distributed to students to work on, in this case, the LKPD developed is in the form of digital LKPD, so that it can be done directly by filling in the space provided in the LKPD using devices owned by students, it can *smartphone* or pc, and laptop. This digital LKPD is very good to be developed because it has various advantages over paper LKPD in general, such as: features that are more attractive, and more varied not only consist of text and images but also graphics, animations and videos (Ladamay et al, 2021).

The development of this digital LKPD can use various kinds of software and the web. There are several websites that facilitate educators in developing digital worksheets such as live worksheets and others, while the geogebra classroom can be used to create digital worksheets based on geogebra. Geogebra can be used to visualize abstract geometric objects quickly, efficiently and accurately (Tamam & Dasari, 2021) which can be used to support mathematics learning activities at school (Rahman et al, 2021). Combines the features of dynamic geometry software, computer algebra systems and spreadsheet programs (Hall & Chamblee, 2013). In addition, GeoGebra also offers the opportunity to create an interactive online learning environment that allows students to explore many avenues for exploring mathematical concepts (Tamam & Dasari, 2021). So with this application, we can develop tools to demonstrate material according to the material we will discuss. By developing a geogebra-based digital LKPD, the formed LKPD will later have a demonstration feature that was previously designed through the geogebra application. The basis for choosing the GeoGebra Classroom in developing this LKPD is that because of its very useful features and in accordance with online and offline learning conditions, students can directly fill out the developed LKPD, coupled with geogebra facilities that are integrated directly into the LKPD, which will add to the student's learning experience and improve student learning. learning effectiveness.

Based on the description above, researchers are motivated to develop learning media that are more suitable and flexible with online learning conditions, especially in high school mathematics learning by developing mathematics learning media in the form of digital worksheets made using the geogebra classroom. By designing geogebra learning media first, we can provide interactive demonstration features that students can use in the digital worksheets. This digital LKPD is interactive, so students can give an active response to the learning activities in it (Suarsana et al., 2019). Interactive learning media will provide a real and effective learning experience in learning (Suarsana et al., 2019). In this study, the

effectiveness of learning will also be seen using student achievement in achieving KKM from the results of practice questions.

In previous studies, digital worksheets have been developed, but do not use the geogebra classroom basis as in this study. In addition, there has been a lot of media development using geogebra, but not applying it to digital worksheets which can also be developed through the geogebra classroom. The set operation material was chosen by the researcher based on information obtained from the teacher in the class that the material is difficult material for students, besides that set operations are new concepts and also basic material obtained by students which will be useful for studying other material in the future, so it requires a good media in its delivery.

Method

Research Methods and Approach

The method used in this research is a research and development method and uses a descriptive quantitative research approach. This development research is a development research on LKPD based on the geogebra classroom and developed with the geogebra web. The media is used in the set operation material at the junior high school level.

This research and development was carried out using the DDD-E model with the aim of producing more interactive media. The product that will be produced is in the form of a digital worksheet that can be accessed with a browser via a cellphone or laptop.

Research subject

The research subjects in this study were students and teachers at UM Laboratory junior high school on November 22, 2021. A total of 32 students from class 7D and also mathematics teachers from class 7D participated in this study. Learners who are research subjects have diverse cognitive abilities, based on their learning outcomes in the previous material.

Research and Development Procedure

This research is research and development, using the DDD-E model (decide, design, develop, evaluate). The first step is the decide stage, the researcher makes observations and also studies the literature to determine the media to be developed and what is needed to carry out the development. The second stage is the design stage, the researcher does the design and planning related to the media to be developed. The third stage is develop, at this stage the researcher begins to develop the media that has been previously designed. The last stage is evaluated, at this stage, the developed media is tested on the research subject, at this stage the validation and revision process is also carried out.

Data Collection Instruments and Techniques

Data collection techniques carried out in this study used interviews, validation sheets and questionnaires. Interviews were conducted to obtain information directly from mathematics teachers regarding the urgency or need for this learning media to overcome problems regarding learning media that occurred. The media validation sheet contains aspects such as the appropriateness of the graphic and the appropriateness of the language. The material validation sheet contains aspects such as content feasibility, presentation feasibility and contextual aspects.

In addition, a questionnaire will be distributed to students to see aspects of the effectiveness and practicality of the media used. To check the practicality, the indicators are as follows, namely in terms of the language used, the appearance of the worksheets and the letters used, the ease of using the worksheets online and offline. Meanwhile, in terms of effectiveness, the indicators are as follows, the use of illustrations to make it easier for students to understand the material, the use of geogebra media in the LKPD to make it easier to understand the material, activities in the LKPD make students develop mathematical abilities on set operations material, the level of enjoyment of students learning mathematics with the developed LKPD and the level of students' confidence to be able to do the test after using the media. Besides that,

Data analysis technique

Data in the form of validation sheets and questionnaires that have been collected from validators and also students are collected and then data analysis is carried out using a descriptive quantitative approach. In order to be processed, data that was previously in the form of qualitative data is converted into quantitative data and then analyzed in a descriptive quantitative way

1. Media Validity

The level of validity of the digital LKPD is obtained from the value given by the validator. The steps carried out in the process of analyzing data obtained from material and media validation questionnaires are to change the letter assessment into a score using a Likert scale with the following conditions.

Table 1. Scoring Rules

Category/value description	Score
Very good	4
Well	3
Not enough	2
Very less	1

After doing the conversion, the average is sought for each question from all validators, then the average will be sought for each indicator in the validation sheet. After that, look for the total average for each validation sheet. Determine the category of validity by matching the total average with the categories defined as follows

Table 2. Validity Level (VR)

The magnitude of VR	Category
$V_r = 4$	Very Valid
$3 < VR < 4$	Valid
$2 < VR < 3$	Less Valid
$1 < VR < 2$	Invalid

2. Practicality and Effectiveness of Media

Experimental media developed in the classroom will provide practical and effective value from the developed media. The results of the practical and effective level were obtained from questionnaires distributed to students after the learning activities using the media were completed. For the level of media effectiveness, it is also seen based on the

percentage of students in achieving the KKM seen from the practice questions given. The questionnaire has 4 answers for each indicator, namely strongly agree, agree, disagree and strongly disagree.

For the level of practicality of the media, it was obtained from a questionnaire distributed after learning. The value obtained will be searched for the average then compared with the practicality interval as in table 3, to assess the practicality of the media.

Table 3. Practicality Level (PR)

The amount of PR	Category
$Pr = 4$	Very practical
$3 < PR < 4$	Practical
$2 < PR < 3$	Less practical
$1 < PR < 2$	Not practical

For the level of effectiveness of the media, it was obtained from a questionnaire distributed after learning. The value obtained will be searched for the average then compared with the effectiveness interval as in table 4. The level of effectiveness of the media is also seen from the test results given at the end of the lesson by looking at the results of the percentage of students who reach the KKM, the percentage of students is then compared with table 5 to see the category of the level of effectiveness of the developed media.

Table 4. Effectiveness Level (Ef)

The magnitude of Ef	Category
$Ef = 4$	Very effective
$3 < Ef < 4$	effective
$2 < Ef < 3$	Less effective
$1 < Ef < 2$	Ineffective

Table 5. The level of effectiveness based on the achievement of KKM (Q)

The magnitude of Q	Category
$80\% < Q < 100\%$	Very good
$60\% < Q < 80\%$	Well
$40\% < Q < 60\%$	Enough
$20\% < Q < 40\%$	Not enough
$Q < 20\%$	Very less

The digital LKPD that was developed is a development to be tested on the research subject, namely the 7D grade students of UM Laboratory junior high school. The validation process is carried out before conducting experiments on research subjects. The procedure of the validation, revision and experiment process can be seen in the diagram in the picture

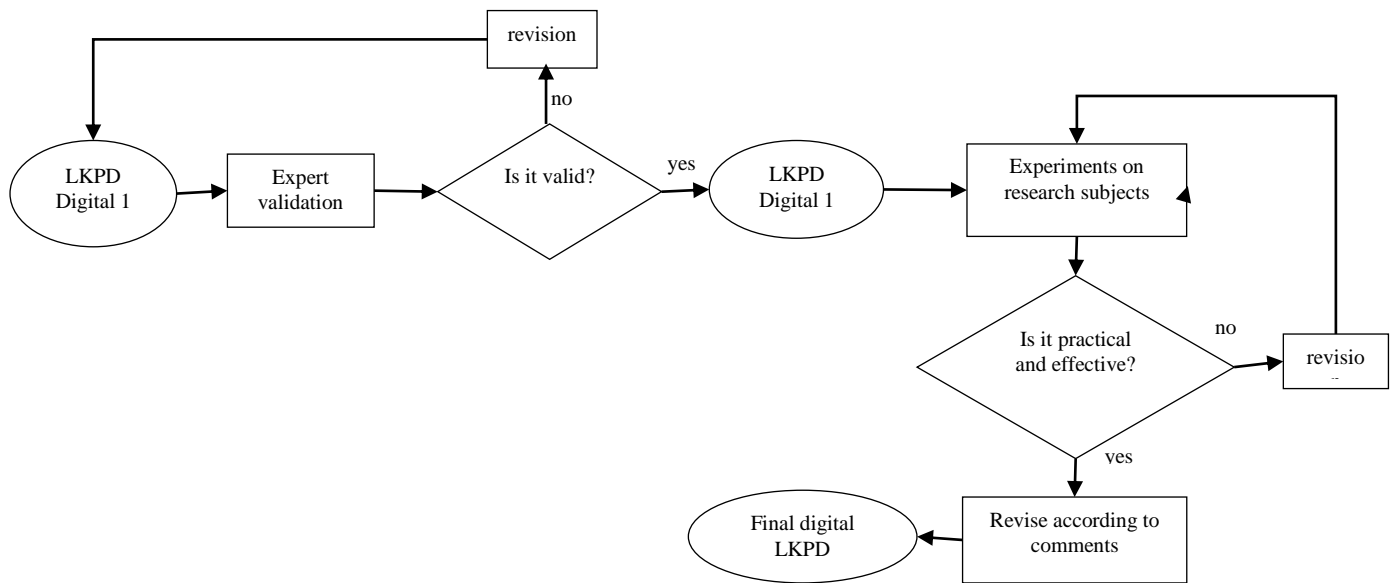


Figure 3 Validation, revision and trial procedures

Results and Discussion

This research uses the DDD-E model which consists of 4 stages, namely decide, design, develop, and evaluate

1. Decide Stage

At this stage, information is collected about problems in classroom learning. This stage was carried out by conducting interviews via google meet with the 7D mathematics teacher at UM Laboratory junior high school. The purpose of collecting this information is to collect relevant information related to the need for the development of learning media. At this stage, the researcher also decided to choose geogebra classroom-based digital media as learning media that needed to be developed. The development of this learning media aims to make learning in the classroom more interesting and fun, the concepts taught are clearer and attract the enthusiasm of students because they are interactive. The state of learning carried out in blended (offline and online) requires adjustments to the learning media used.

2. Design Stage

At this stage, the researcher designs the digital LKPD learning media that will be developed. The design or design consists of the selection of basic competencies and the formulation of learning learning objectives to be achieved in the set operation material. After that, plan the digital LKPD design using power point. At this stage, it is determined that the selected basic competencies are KD 3.4 and 4.4 regarding sets with learning objectives focused on set operations consisting of

- a. so that students know how to perform binary operations on sets
- b. so that students know how to perform binary operations on sets using contextual problems
- c. so that students are able to solve contextual problems related to binary operations on sets

The next step is to design activities as well as display the developed LKPD. In this stage, the researcher designs learning activities along with the LKPD display design using power point. The description of the activities is as follows.

a. Designing Learning Activities

This process aims to determine the activities that will be given to students during learning activities. Learning activities are endeavored to direct students to think towards concepts in performing set operations. This learning activity design activity was carried out simultaneously with designing the appearance of the LKPD using power point.

b. Worksheet Design with Power point

This design process aims to make the worksheets developed more attractive with fun layouts, colours and pictures according to the age of the students. The use of power point was chosen because it is relatively easy to use and also has complete enough features to design worksheets so that they are more interesting to look at. This design activity is carried out simultaneously with designing learning activities to be more effective and efficient in their manufacture. The following is a sample of the results obtained after carrying out this process



Figure 4 LKPD cover design

On the cover there are learning objectives, the title of the worksheet and also an illustration of a *venn* diagram that intersects as an illustration of the set operation.



Figure 5 Activity 1 on LKPD

Activity 1 in the LKPD will give students an initial picture and stimulate students' knowledge about set operations, in this activity, students will find concepts about operations.



Figure 6 Activity 2 on LKPD

Activity 2 in the LKPD provides activities for students to try to solve contextual problems in operations, these activities will later lead students to the nature of the combination between two sets.



Figure 7 Activity 3 on LKPD

In activity 3, students will be asked to do activities that will provide students with information about the nature of the complement set



Figure 8 Activity 4 on LKPD

In activity 4, students will be asked to carry out activities that will provide students with information about the nature of the difference between two sets



Figure 9 activity pieces

After finishing the design, the researcher saves the design in jpg format and then cuts the activities

3. Development Stage

At this stage, the researcher makes or develops learning media based on the plans that have been prepared at the design stage. This process consists of developing the geogebra media according to the activity plan first using the geogebra application, then using the geogebra classroom website to develop the LKPD learning media as a whole. The following is a detailed process

a. Geogebra Media Making

After designing learning activities, and designing LKPD, then making geogebra media according to the activities that have been designed. The following are the results of the geogebra media development

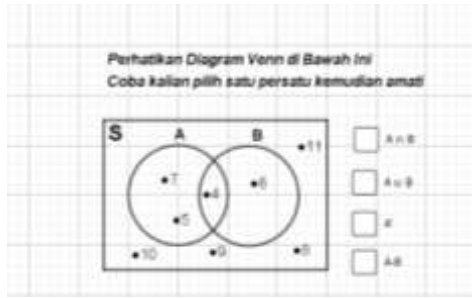


Figure 10 geogebra media 1

This media is used in activity 1 to provide an initial concept of operations on sets

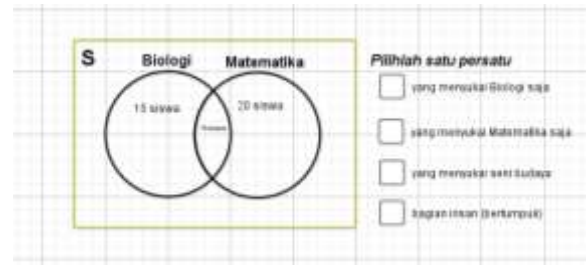


Figure 11 geogebra media 2

This media is used in activity 2 to find the properties of the combination of sets

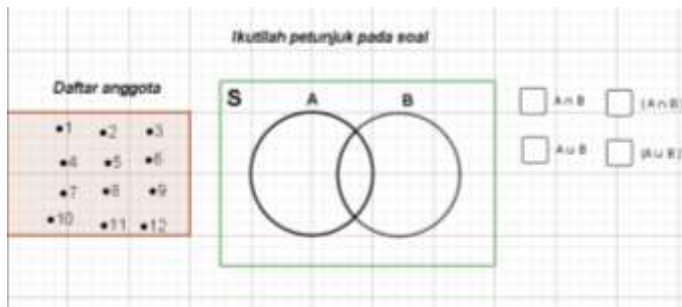


Figure 12 geogebra media 3

This media is used to solve examples of problems about the complement and intersection of sets

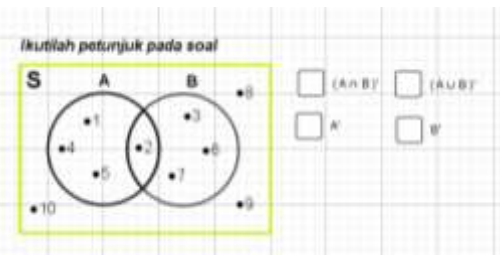


Figure 13 geogebra media 4

This medium is used to find the properties of the complement set

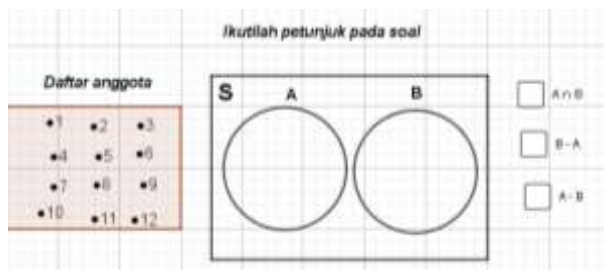


Figure 14 geogebra media 5

Geogebra media is used to find the nature of the difference between two sets if the sets are independent of each other

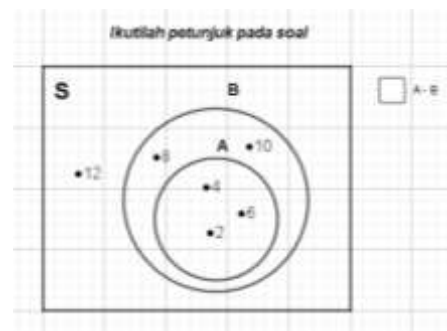


Figure 15 media geogebra 6

This media is used to find the difference between two sets if one of them is a subset

b. Integrating Created Sections into Geogebra Classroom

The process of integrating or unifying the parts that have been made in the geogebra classroom is the final process of developing this digital LKPD media. Each of these parts will be put together using the geogebra website so that it becomes a unified whole.



Figure 16 creating an activity on the geogebra web

Creating activities to start making digital worksheets using the geogebra web



Figure 17 titling

Give the title as the identity of the LKPD, then click on the image to start uploading the LKPD design that has been made through Powerpoint previously



Figure 18 uploading activity pieces

After that, press "choose image file" to select the LKPD piece to be uploaded



Figure 19 upload completion

After selecting the image, click "done" to finish uploading. This step is carried out continuously according to the number of activities that have been made previously



Figure 20 geogebra upload

To upload geogebra, select "geogebra" in the enter element section



Figure 21 selecting geogebra files

Choose the geogebra file according to the learning activities that have been designed



Figure 22 geogebra media adjustment

After making the selection, adjust the appearance of the geogebra media that was created so that it can be accessed easily and more attractively



Figure 23 making a class that will be followed by students

So that students can work, choose "create a lesson" beforehand so that the classroom will be formed.

4. Evaluate Stage

At this stage, the researcher conducted an evaluation using validation tests, media trials and the revision process. Validation was carried out by media experts as well as material experts as well as 7D grade math teachers. Suggestions and comments as well as validation results from validators and teachers are used as a reference for making revisions.

Validation is carried out using a validation sheet which is then assessed by media and material experts. The media validation sheet contains aspects such as the appropriateness of the graphic and the appropriateness of the language. The material validation sheet contains aspects such as content feasibility, presentation feasibility and contextual aspects. Validation using a questionnaire with a scale of 1-4. The quantitative data from the validation results are in the table

Table 5. Media Expert Validation Results

Indicator	Description	average
Cover Design	The appearance of the layout elements on the cover has unity and harmony	3.5
	The color of the layout element is harmonious and clarifies the function of the cover as the identity of the LKPD	3.5
	The letters used are attractive and easy to read	3.5
	The cover illustration depicts the contents	3.5
average		3.5
Content Design	Consistent layout	4
	Clear paragraph separation	4
	Spacing between text and illustrations is appropriate	3.5
	Geogebra illustration can be used	3
	Geogebra interactive and dynamic illustration	3
	The use of decoration does not interfere	3.5
	Use the same typeface	3.5
	Variation of letters (bold, italic, small,, capital) is not excessive	3.5
Spacing between paragraphs and normal letters	3.5	
The hierarchy between titles is clear	3.5	

	Structured LKPD content design	3.5
	The presentation of the media is carried out in a coherent manner	3.5
	Media presentation supports students to be involved in learning	4
average		3.54
straightforward	Correct sentence structure	3.5
	Sentence effectiveness	3
	Term standard	3
average		3.17
communicative	Understanding of messages or information	3.5
	average	3.5
Dialogic and interactive	ability to motivate students	3.5
	ability to encourage critical thinking	3.5
average		3.5
conformity with the development of students	conformity with the intellectual development of students	3.5
	average	3.5
conformity with language rules	grammar accuracy	4
	spelling accuracy	3.5
average		3.75
consistency of use of terms	consistency of use of terms	4
	consistency of use of symbols or icons	3
average		3.5
total average		3.49

Table 6. Material Expert Validation Results

indicator	description	average
material suitability with SK and KD	Material equipment	4
	Material freedom	3
	Material depth	3
average		3.33
Material Accuracy	Concept and definition accuracy	3.5
	accuracy of data and facts	3.5
	sample accuracy	4
	accuracy of drawings, diagrams and illustrations	4

	term accuracy	3.5
	accuracy of symbols, notations and icons	3
	average	3.58
Material Update	the suitability of the material with the development of science	3.5
	use case examples in everyday life	3.5
	average	3.5
encourage curiosity	Encourage curiosity	4
	create the ability to ask questions	3
	average	3.5
Presentation technique	systematic consistency of presentation in learning activities	4
	concept breakdown	4
	material depth	3
	average	3.67
Serving support	examples of questions in learning activities	3.5
	practice questions in learning activities	4
	average	3.75
learning presentation	student involvement	3.5
	average	3.5
Coherence and coherence in thinking	linkages between learning activities	3
	the integrity of meaning in learning activities	3
	average	3
contextual nature	the relationship between the material being taught and students' real world situations	3
	the ability to encourage students to make connections between the knowledge possessed by students and their application in everyday life	3.5
	average	3.25
Contextual component	constructivism	4
	find	3
	ask	3.5

modeling	3
reflection	3.5
average	3.4
<hr/>	
total average	3.45

Tables 5 and 6 show overall, the average for media validation is 3.49 and for material validation is 3.45. Based on table 2, the learning media developed are categorized as valid both in terms of media and material. So that learning media can be used or applied to students. There are several suggestions and inputs given by the validator. The suggestions and inputs are as follows

Suggestions and feedback

- Corrected writing of complement symbols, substitution of editors for one-part reasoning activities, to show the members of the set first and then compare
- The use of model syntax and learning approaches is clarified (scientific)
- Separating B - A and Bc from the previous question
- Each activity is further clarified using the Scientific syntax.
- Provide assistance in drawing conclusions

The LKPD that has been validated is then revised according to the suggestions and inputs obtained from the validator. After the revision, the LKPD was then tested on 7D junior high school students

Trial process

The trial process was carried out after the learning media developed was revised during the validation process and declared valid. The trial process was carried out in one stage. The trial process was carried out on 32 students of class 7D. In the trial process, data were obtained regarding the effectiveness and practicality of the developed media. The results of the level of effectiveness and practicality obtained from the trial are listed in table 7. Table 7 shows that the average practicality of the media is 3.24. Based on table 3, the media developed is practical. Table 7 also shows the average level of media effectiveness is 3.25. Based on table 4, the media developed was effective. In addition, the results of tests conducted at the end of the lesson showed that 78% of students reached the KKM. Based on table 5,

Table 7 Student Response Questionnaire Results

Statement	Average
<hr/>	
Practical aspects	
LKPD uses easy-to-understand language	3.38
LKPD uses sentences that do not cause double meaning	3.31
I understand the words/sentences in the LKPD	3.28
The choice of font, size, and spacing used makes it easier for me to read the LKPD	3.25

LKPD is easy to use	3.16
LKPD is good for use in online learning	3.31
LKPD makes learning activities easier	3.38
The activity instructions in the LKPD are clear, making it easier for me to carry out all activities	3.00
LKPD with geogebra makes me interested in working on it	3.13
This geogebra LKPD is interesting	3.19
	3.24
Effectiveness aspect	
The illustrations on the worksheets help me understand the material	3.28
Geogebra media on LKPD helps me in understanding the material	3.34
Geogebra media on LKPD is more interactive than ordinary pictures/graphics	3.25
The activities provided help me develop my math skills	3.28
When working on LKPD, I check my work and draw conclusions according to the instructions given	3.19
LKPD activities allow me to conclude and capture important ideas from the set operations material	3.25
I can relate the contents of the LKPD with events that I encounter in my daily life	3.16
I am able to perform set operations through LKPD	3.16
I can gain knowledge by participating in activities on LKPD	3.31
After studying set operations using this worksheet, I feel confident that I will succeed in the test	3.16
LKPD is very useful for me	3.38
I enjoy studying math with this LKPD	3.25
	3.25

After conducting the trial process, suggestions and input were obtained from students and teachers. Overall, the comments given are positive comments on this learning media. Some of the comments and suggestions given are as follows

- In the implementation in the classroom, it is necessary to ensure that all students are ready with smartphones and data packages.
- For the first meeting with this media, it is necessary to be guided in a coherent manner
- Need to give additional info about using geogebra
- Need to add more information about the complement symbol $A' = A^c$

Based on the results of the trial and also comments from the teacher on the media used, a revision was made to this digital LKPD. After the revision is done, the final LKPD can be used for 7th grade students of junior high school

Geogebra classroom-based digital student worksheets are products developed in this research. The worksheets were developed in the form of links consisting of 4 separate links for each learning activity. Validation from material and media experts stated that the LKPD developed was valid. This proves that the design, activities, and also the content of the LKPD have fulfilled the function of the LKPD. A function of the LKPD which is very much in learning activities is as follows, starting from helping the formation of concepts,

increasing the ability of students to find and develop processes (Ahmad et al. 2021), as a guide in the teaching and learning process, a means of independent learning for students in understanding assignments (Basuki & Wijaya, 2019) and add more information about concepts and train critical thinking (Kholid, Hamida, Pradana, & Maharani, 2020; Maharani, Nusantara, Rahman, & Qohar, 2019; Krisdiana et al., 2019). To start using the LKPD, the teacher as an instructor in learning must first start the classroom, then share the link from the LKPD to students. Students open the link using the browser found on their respective smartphones. After the link page opens, students are asked to fill in their identity first and then enter the classroom. Activities are carried out sequentially starting from activities 1 to 4.

The results of the practicality test show that the LKPD developed is in the practical category. These results indicate that this digital worksheet is easy to use, the instructions and language used are clear, interactive and also interesting. The LKPD was developed with the aim that the student learning process on set operations material can be easier and interactive because it has more features with interactive illustrations, this is in line with the opinion Ladamay et al, (2021) that electronic LKPD has more attractive features, and is more varied, not only consisting of text and images but also graphics, animation and video.

The use of digital LKPD is also very useful during the learning period in this pandemic era, the use of technology as well as learning activities and media adapted to the learning environment is very important to do. In relation to the function of the LKPD which is a learning medium, its existence is very important in teaching and learning activities, in line with Widodo & Wahyudin (2018). Learning media is a tool used by teachers to convey messages to students, serves to create learning situations and contains activities. LKPD in digital form will be very suitable for online and offline learning situations. This is in line with the opinion Hu et al., (2021) that the use of digital technology is needed during the online learning period in the pandemic era.

The results of the effectiveness test show that digital worksheets are included in the effective category, these results indicate that the developed worksheets can help students learn mathematics, especially on set operations. The LKPD is interactive so that students can better understand the material being taught and be effective in learning. In line with opinion Suarsana et al., (2019) Interactive learning media will provide a real and effective learning experience during learning activities

Another thing that is also very important in learning mathematics is the use of technology according to Yates et al. (2021), the use of technology is needed so that the student learning experience becomes more effective, in this digital LKPD, it is equipped with illustrations developed through interactive geogebra in every activity with the aim of making learning activities more effective and having a good positive impact on learning. In line with opinion Horzum et al., (2017) that geogebra has many positive impacts, starting from improving students' abilities, developing positive attitudes of students in learning, increasing students' understanding, thinking and visualization. In addition, due to the situation of students who are increasingly disinterested in learning mathematics during online learning (Hima et al., 2021), the use of this digital LKPD fosters student interest in learning activities, because of its new and interactive features, fostering positive student attitudes in learning (Horzum et al, 2017) such as having a desire to explore and participate in learning. This is in accordance with one of the functions of learning media which is also used to foster student interest in learning (Astuti et al., 2019).

This digital LKPD is also developed based on a scientific approach so that it can improve students' abilities. In line with opinion Hobri et al., (2019) which states that the scientific approach can improve the abilities, attitudes and knowledge of students. So that the activities presented in the digital LKPD are certainly more effective in increasing the ability of students to learn mathematics.

Conclusion

The digital geogebra classroom-based LKPD (student worksheet) for set operation material has been developed. The developed learning media has been validated and obtained a media validation score of 3.49 and material validation 3.45 which indicates that this media is valid. The results of the practicality test obtained from the questionnaire distributed to students got a score of 3.24. As for the effectiveness of getting a score of 3.25. These results indicate that the media developed is practical and effective as well as supported by test results, where 78% of students reach the KKM. Based on the results of validation, effectiveness and practicality, the developed digital worksheet based on the geogebra classroom can be used to study the topic of set operations.

In situations where learning is still carried out offline or blended (online and offline), this digital worksheet will be very useful and needed. With its interactive nature and also equipped with geogebra, it will increasingly provide good benefits for math learning activities in the classroom. This LKPD can be used as a reference to develop LKPD on other topics that can also take advantage of geogebra. For teachers and also students, especially at the junior high school level, this digital LKPD can be an alternative media to learn set operations that are integrated with geogebra.

After the implementation of this development research, here are some limitations on the digital LKPD that has been developed

- Digital LKPD can be operated using a cellphone/laptop/pc that can access the internet
- Digital worksheets are only for learning on set operation material
- The effectiveness of the digital LKPD is seen from the results of the questionnaire and also the percentage of students who reach the KKM on the given test

Based on these restrictions, further research can develop digital worksheets based on the geogebra classroom, for other topics that can use geogebra in its implementation.

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