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Didactic Design Analysis Of Quadrilateral Learning In The Term Of Interactive Media Based On Adobe Flash Through Contextual Teaching And Learning Approach

Analisis Desain Didaktis Pembelajaran Segiempat Berupa Media Interaktif Berbasis *Adobe Flash* Melalui Pendekatan *Contextual Teaching And Learning*

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ABSTRAK

Penelitian ini dilakukan untuk melihat dugaan learning obstacle yang muncul pada desain didaktis dan memberikan usulan desain didaktis untuk mengatasi dugaan *learning obstacle*. Jenis penelitian yang digunakan yaitu penelitian kualitatif dengan model *Didactical Design Research* (DDR), penelitian ini menggunakan teknik triangulasi dan pada Penelitian Desain Didaktis (*Didactical Design Research*) terdapat tiga tahap analisis yaitu Prospective Analysis melakukan wawancara kepada guru model mengenai desain didaktis yang dipakai pada saat pembelajaran, Metapedadidactic Analysis dilakukan analisis desain didaktis yang telah dibuat oleh guru model, dugaan/kemungkinan learning obstacle apa yang muncul dan apa penyebabnya, Retrospective Analysis membuat kesimpulan serta usulan desain didaktis pada materi segiempat. Subjek pada penelitian ini yaitu desain didaktis berupa RPP dan media pembelajaran *Adobe Flash* melalui *Contextual Teaching and Learning* pada materi segiempat yang telah dibuat oleh guru model. Berdasarkan analisis terdapat dugaan learning obstacle yang muncul pada desain didaktis, yaitu didactical learning obstacle dan epistemological learning obstacle, sehingga menghasilkan usulan desain didaktis untuk mengurangi learning obstacle.

Kata Kunci : Desain Didaktis, *Learning Obstacle*, Segiempat, *Contextual Teaching and Learning*.

ABSTRACT

This research was conducted to see the alleged learning obstacle that appeared in the didactic design and provide a didactic design proposal to overcome the alleged learning obstacle. The type of research used is qualitative research with the *Didactical Design Research* (DDR) model, this research uses triangulation techniques and in the *Didactical Design Research* there are three stages of analysis, namely Prospective Analysis, conducting interviews with model teachers regarding didactic designs used at the time. In learning, Metapedadidactic Analysis is carried out by analyzing the didactic design that has been made by the model teacher, what learning obstacle is suspected and what causes it, Retrospective Analysis makes conclusions and didactic design proposals on the rectangular material. The subject of this research is the didactic design in the form of lesson plans and learning media on *Adobe Flash* through *Contextual Teaching and Learning* that have been made by the model teacher. Based on the analysis, there is an assumption that learning obstacle appears in the didactic design, namely didactical learning obstacle and epistemological learning obstacle, resulting in a didactic design proposal to reduce learning obstacle.

Keywords : Didactic Design, Learning Obstacle, Quadrilateral, *Contextual Teaching and Learning*.

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PRELIMINARY

The national education system has the aim of developing a complete human being and educating the Indonesian nation. Based on UU no. 20 of 2003 learning mathematics is oriented to the mindset of everyday life, so the role of the teacher in transferring mathematical knowledge which includes concepts to solve everyday problems is very important. The learning process is the interaction of students, teachers, teaching materials (Suryadi, 2010). Mathematics is a science that deals with abstract forms or structures. One of the branches of mathematics is geometry, where geometry has become an important thing for our daily life. According to Rofii et al (2018), geometry is known to students before entering school so that it has a greater chance of being understood and becomes one of the important subjects in learning mathematics.

Geometry is studied starting from elementary school, junior high school, high school, even up to college. But in studying geometry, some students are less interested because they think that geometry is difficult to learn. So that many students still have difficulty understanding the concepts of geometry, geometry material is identified as difficult material for most teachers and students (Adolphus, 2011). One of the geometry materials taught in junior high school is quadrilaterals. Although the material for quadrilaterals has been studied in elementary school, many students still make mistakes when answering problems about quadrilaterals. Ningrum (2016) explains that most junior high school students have misconceptions about the properties of quadrilaterals, these errors are the cause of the lack of student learning outcomes. Basuki (2012) also argues that the lack of concepts about quadrilaterals is the cause of students' difficulties in learning geometry material. To build good interactions in learning is not an easy thing, many students experience obstacles when learning mathematics. These learning barriers are commonly known as learning obstacles, according to Brousseau (1997) learning obstacles are divided into three types, namely: (1) ontogenical learning obstacles, namely barriers related to the stage of mental development of children according to age and biological development, (2)

didactical learning obstacle, namely obstacles that arise from choices related to the learning system, (3) epistemological learning obstacles, namely obstacles that arise due to lack of knowledge possessed by students.

Based on the results of a preliminary study to class VIII students who have received quadrilateral learning. The results showed that there was an epistemological learning obstacle type of learning obstacle, namely obstacles related to students' limited knowledge of a certain context. Epistemological barriers are also related to the origin of the concept that is obtained is limited. Where students do not understand the concept of quadrilateral material, so students cannot solve the problems given. Based on these problems the teacher has a role that can reduce the learning obstacle or learning barrier experienced by students when learning mathematics by paying attention to the teaching materials used. Usually the teaching materials used are only focused on learning objectives without paying attention to obstacles that may occur during learning. According to Supriatna (2011) the development of didactic design has a role in learning mathematics and classroom learning, the development of didactic design needs to be continuously carried out by both teachers and researchers so that learning can be carried out properly.

In the learning process the teacher's role as a facilitator and motivator is very important. According to Yunianto, et al., (2021) the competence and skills of teachers affect student performance. Therefore, the teacher must have a strategy so that students can learn effectively and efficiently according to the expected goals (Sumarni, et al., 2018).

One of the efforts that must be made by the teacher is to use an appropriate learning approach and in accordance with the material or concept being taught. One approach that is suitable for use in geometry material is the Contextual Teaching and Learning (CTL) model. According to Sari (2017) CTL is a learning process in the form of learner-centered and learning in context. This learning approach allows the learning process to occur where students use their understanding and academic abilities in solving real problems, both individually and in groups, and interactive learning media based on Adobe Flash that can help students learn quadrilaterals.

Prastitasari, et al (2018) research produces a conclusion, namely based on the results of learning during six meetings, it shows that using teaching materials for rectangular flat shapes based on a river environment can improve student learning outcomes because during six lessons, 25 respondents got scores above the KKM that has been set. by the school is 70 and the learning outcomes of each meeting show the criteria for effectiveness so that no revision is needed for the teaching materials. Contextual-based teaching

materials in the form of student and teacher books can help students better understand the concept of rectangular material and help teachers to more easily deliver rectangular material, where valid and practical teaching materials can be said to be able to improve learning outcomes and quality. It can be seen from the test results above that from the six meetings there was a significant increase. There is also an explanation regarding the design of rectangular flat shape teaching materials, namely in Prayogi, et al's research (2019), using qualitative and quantitative research methods, and using the Didactical Design Research (DDR) research design which develops the design of rectangular flat shape teaching materials based on mathematical communication skills. in junior high school students through discovery learning models. In this study, the teaching material made was a mathematics module, and concluded that by using the same description of the instrument before conducting a limited test using the quadrilateral module, the average score of students who answered incorrectly was 95.83%, while the average score was 95.83%. the average number of students who answered incorrectly after learning with the module was 34.44%. Which means that the use of the rectangular flat shape module still shows a learning obstacle that has not been completely resolved but students have been helped in reducing the learning obstacle. To overcome the learning obstacle, the researcher made a didactic design in the form of a module based on mathematical communication skills with a discovery learning model. Where after being tested on students, it turns out that the module is effective in reducing the learning obstacles that arise. From the increase in students who answered correctly for each indicator, it can be concluded that the teaching materials in the form of modules based on mathematical communication skills with discovery learning models are effective in reducing learning obstacles.

The development of science and technology is increasingly rapid, requiring humans to continue to learn so as not to be left behind in the development of science and technology (Sumarni, et al., 2017). So that in learning geometry, technology must also be used, one of which can use Adobe Flash media. According to Susiaty (2018) in his research, it was found that the results of the trial of Adobe Flash interactive learning media on rectangular material really helped students in learning, it could be seen in the changes in increased concept understanding. This is supported by the results of the evaluation questionnaire which said that during learning students did not experience boredom because there were animations that appeared during learning. So from the above results it can be concluded that quadrilateral learning by using adobe flash learning media can improve students' understanding of concepts in learning. There are many studies that examine

quadrilateral learning, creating effective didactic designs to facilitate students in learning quadrilateral material, but there are still few studies that analyze the ability of teachers to develop didactic designs as an effort to overcome learning barriers experienced by students. Even though this analysis is very important to do considering students are the main subject in the learning process, it is also necessary to pay attention to a didactic design that can facilitate students in learning mathematics (Komalasari, Sumarni, & Adiastry, 2021). Therefore, the researcher intends to conduct this research with the following objectives: (1) to analyze the didactic design of rectangular learning in the form of interactive media based on Adobe Flash through a contextual teaching and learning approach designed by the teacher in full (2) to analyze the alleged learning obstacles or what learning barriers arise when learning to use a didactic design of rectangular material in the form of lesson plans with a CTL approach and interactive media based on Adobe Flash (3) analyzing the causes of the emergence of alleged learning obstacles that arise during learning using a didactic design of rectangular material in the form of lesson plans with a CTL approach and interactive media based on Adobe Flash (4) propose a didactic design to overcome alleged learning barriers that arise in quadrilateral learning with Adobe Flash-based interactive media.

METHODS

The research conducted by the researcher is a qualitative research using the Didactical Design Research (DDR) model. Where the purpose of this study is to find out a didactic design suitable for overcoming the learning obstacles experienced by students when learning mathematics with quadrilaterals.

According to Suryadi (2010) Didactical Design Research (DDR) consists of three stages, namely: (1) Prospective analysis in the form of a hypothetical didactic design and anticipation of a pedagogical didactic (ADP) conducted before learning (2) A pedagogical or metapedagogical didactic situation analysis carried out during learning (3) Retrospective analysis, namely the analysis that relates the results of the ADP analysis and the results of the pedagogical didactic situation analysis, carried out after learning. This study analyzes a didactic design that has been prepared by the model teacher in the form of lesson plans and interactive learning media based on Adobe Flash with a CTL approach, for the stages in this study adapted from (Putri, 2019). The steps carried out are as follows:

a. Planning

1. Determine the focus of research related to didactical designs used in learning mathematics in junior high schools
2. Choosing rectangular learning materials related to definitions, properties, area and perimeter as research material
3. Carry out preliminary studies in class VIII who have received quadrilateral learning
4. Analyzing the results of preliminary studies that have been carried out

b. Prospective Analysis

1. Making a didactic design interview instrument made by a model teacher
2. Conducting interviews with model teachers related to the didactic design used in quadrilateral learning
3. Analysis of the didactic design that has been prepared by the model teacher and the results of the interview

c. Metapedadidactic Analysis

1. Analyzing the possibility of students experiencing learning barriers when learning takes place seen from the didactic design that has been prepared by the model teacher
2. Analyzing the causes of the emergence of learning barriers seen from the didactic design that has been prepared by the model teacher

d. Retrospective Analysis

1. Make conclusions about the obstacles experienced by students in learning seen from the didactic design that has been analyzed
2. Prepare a didactic design recommendation for rectangular material based on the analysis that has been done

This research was carried out in April 2020. The subject of this research is a didactic design that has been prepared by the model teacher, namely Lesson Plan and interactive learning media based on Adobe Flash through the Contextual Teaching and Learning (CTL) approach for learning mathematics with quadrilaterals developed by (Yuniar, Sumarni, & Adiastuty, 2020).

The instrument used is a non-test instrument, at the initial stage the instrument needed is an interview guide that contains questions that have been made and prepared beforehand, regarding the analyzed learning design. Then the questions were asked to the model teacher. In the next stage, the instrument used is the didactic design made by the

model teacher, the researcher analyzes the didactic design in order to find out the alleged obstacles that will occur during learning and what causes the learning obstacle to appear in terms of the didactic design that has been made by the model teacher.

Data collection techniques used triangulation techniques, (1) interviews were conducted with model teachers related to the didactic design that was made to be implemented when learning the material of quadrilaterals. This interview aims to dig up information about the complete didactic design made by the model teacher. (2) the observations made are to observe the didactic design made by the model teacher. In addition, it also observes how the learning flow is listed in the didactic design, and observes the didactic design related to alleged learning barriers that arise during learning, and analyzes what causes the emergence of learning barriers (3) the documentation taken is in the form of a didactic design made by the teacher. (Lesson Plan and Adobe Flash-based interactive learning media for rectangular shape material) as well as videos and photos during interviews with model teachers.

Then the data analysis went through three stages of DDR, namely Prospective Analysis, Metapedadidactic Analysis, and Retrospective Analysis. The data collected in this study were data on alleged learning obstacles (Learning Obstacles) and the causes of the emergence of these learning barriers which were analyzed from a didactic design related to quadrilaterals through observation, interviews, and documentation. At the Prospective Analysis stage, interviewing the model teacher regarding the didactic design used during learning, what teaching materials were developed for quadrilateral learning. At the time of conducting interviews, the tools for documenting were using mobile phones to take videos and photos. Then analyze the learning design of the rectangular flat shape material and the results of the interviews that have been conducted. Then at the Metapedadidactic Analysis stage, an analysis of the didactic design that has been made by the model teacher is carried out, what learning obstacles are suspected/possible during the learning process and what causes the learning obstacles to appear. The last stage is Retrospective Analysis, at this stage conclusions are made regarding the didactic design that has been analyzed. Then after that make a didactic design proposal on the rectangular material based on a series of analyzes that have been carried out, this aims to produce ideal learning (good and meaningful learning so that students understand what is being learned and do not cause obstacles during learning) and can reduce learning obstacles that arise. experienced by students.

RESULTS AND DISCUSSION

Didactic Design of Quadrilateral Learning in the Form of Adobe Flash-Based Interactive Media Through Contextual Teaching and Learning Approaches Designed by Model Teachers

The research that has been carried out aims to determine whether the didactic design that has been prepared by the model teacher can overcome student learning barriers or not, the didactic design that has been prepared by the model teacher is in the form of a Lesson Plann and Adobe Flash-based learning media through a Contextual Teaching and Learning (CTL) approach. To find out how the didactic design was designed by the model teacher, here the researcher conducted interviews with the model teacher and analyzed the results of the interviews and compiled a hypothetical learning trajectory (HLT) to predict the learning that would be carried out based on the plans made by the model teacher.

Based on the results of interviews with the perspective of Learning Trajectory (LT), Learning Obstacle (LO), and Theory of Didactical Situation (TDS) theories that, the purpose of learning quadrilaterals is not just a formality of curriculum demands, but also to get to know the kinds, characteristics of - properties, and formulas of quadrilaterals both in theory and in everyday life. Learning activities are dominated by students because according to the teacher the student-centered method model is suitable for students to understand the concept of quadrilaterals, because by using the student-centered method students can find and solve a problem independently, this is the same as Brousseau (1997)) that the Theory of Didactical Situation (TDS) is a constructivist learning theory that opposes teachers to directly provide information to students without the learning process experienced by the students themselves. Based on the perspective of Learning Obstacle (LO) theory, predictions of difficulties experienced by students appear, namely students have difficulty in answering mathematical connection questions, this difficulty refers to one type of learning obstacle, namely epistemological learning obstacle, where the learning obstacle is related to the limited knowledge of students in understanding the concept of quadrilaterals, this is in line with didactical design research, whose main focus is the obstacles experienced by students in certain materials, so there is a very close direct relationship with related individuals such as students and teachers (Prediger, 2019). Based on the Theory of Didactical Situation (TDS) perspective, the learning process will use the student-centered method where students are provided with media and learning resources that have been prepared by the model teacher to understand the concept of quadrilaterals. Developing a hypothetical learning trajectory is a step taken before learning, where the

HLT contains the learning trajectory that will be traversed by students, according to Nuroniah (2014), namely in developing the HLT, there are three components, namely (1) the objectives of learning mathematics; (2) learning instruments to be used; and (3) hypothetical learning process. The following is the HLT for learning quadrilaterals.

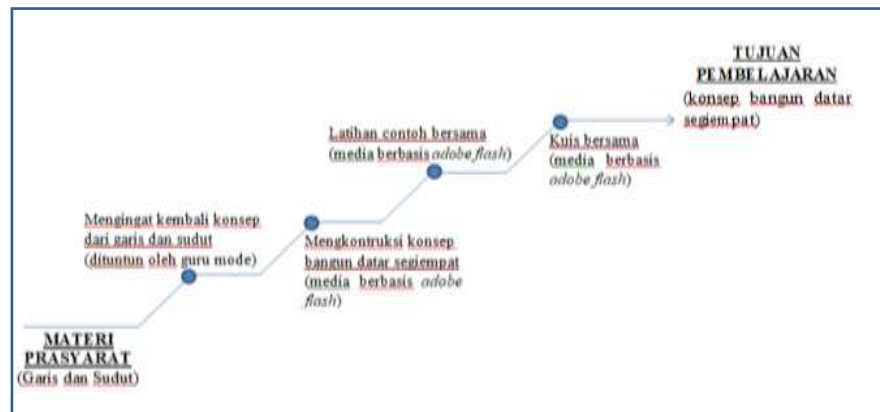


Figure 1. HLT learning quadrilateral

In the next stage, the researcher analyzes the didactic design that has been prepared by the model teacher, the function of the didactic design is as a guide in the learning process, creating an active learning process where students do not have to depend on the teacher alone and the teacher acts as a facilitator for students (Prastowo, 2016). The didactic design prepared by the model teacher was in the form of a Lesson Plan and adobe flash-based learning media through a CTL approach which was developed into an application that can be used on students' mobile phones and divided into three meetings. For the first meeting, namely studying the shapes of parallelograms and rectangles, for the second meeting, namely studying the shapes of rhombuses and squares, and for the third meeting, namely studying the shapes of trapezoids and kites. In the didactic lesson plan design, the model teacher uses a CTL approach for the flow of learning activities, besides that the model teacher also uses discussion and question and answer learning methods where students are required to be active during learning (student centered). During learning, students will also be assisted with learning media that contains material, practice questions, and quiz questions that will be used by students, the use of learning media can help teachers and students to facilitate learning. To use the learning media, students must first install the media on their respective cellphones, in the application the model teacher has designed the learning media as simple as possible so that students can easily learn it. In addition, when students study the material for rectangular shapes, the model teacher

provides clues in the form of images that can make it easier for students to construct the definitions, properties, and formulas of each rectangular shape (Figure 2).



Figure 2. Clue to construct definitions, properties, and formulas

Alleged Learning Obstacles That Appear during Learning Using the Didactic Design of Quadrilateral Materials in the form of Lesson Plan with CTL Approach and Adobe Flash-Based Interactive Media

Alleged learning obstacles that appear in the didactic design prepared by the model teacher are:

In the first meeting, there were allegations of a learning obstacle of the didactical learning obstacle type or an obstacle related to errors made by the teacher and an epistemological learning obstacle or obstacle experienced by students because students did not understand the origin of the concept of the parallelogram being taught as shown in the image below. :

2	<p>Perhatikan gambar berikut.</p> <p>ABCD merupakan sebuah jajargenjang. Hitunglah $2x - y + 2z$!</p>	<p>Dik :</p> <p>ABCD jajargenjang</p> <p>$\angle ADF = 60^\circ$</p> <p>$\angle BDC = 70^\circ$</p> <p>$\angle ADB = 2y$</p> <p>$\angle ABD = 7x$</p> <p>$\angle CBE = 4x$</p> <p>Dit. $2x - y + 2z$?</p>	5
		<p>Selanjutnya, $\angle ABD = \angle BDC$ karena keduanya merupakan sudut dalam bersebrangan.</p> <p>$\angle ABD = \angle BDC$</p> <p>$7z = 70^\circ$</p> <p>$z = \frac{70^\circ}{7}$</p> <p>$= 10^\circ$</p>	5

Figure 3. Wrong in entering variables

In the question section there is an image of a parallelogram, where it is known that ABD is $7z$ and in the answer section the model teacher writes that it is known that ABD is $7x$. But in the answer section, the model teacher explained that ABD of $7z$ corresponds to what is known in the problem. The error written by the model teacher raises the suspicion of a learning obstacle of the didactical learning obstacle type, according to Broseau (2002) a didactical learning obstacle is an obstacle related to errors made by the teacher.

	<p><u>Luas tanah Pak Salim yang tersisa</u></p> $= (x^2 + 8x) - (4x - 16)$ $= x^2 + 8x - 4x + 16$ $= (x^2 + 8x + 16) \text{ cm}$ <p>Tanah pak salim yang tersisa ada $(x^2 + 8x + 16) \text{ cm}$</p>	10
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Figure 4. Wrong operation of algebraic forms

There was an error when subtracting an equation. Where the model teacher wrote $(x^2 + 8x - 4x + 16 = x^2 + 8x + 16)$ while the correct answer was $(x^2 + 8x - 4x + 16 = x^2 + 4x + 16)$. This question is also used in learning media as an example of parallelogram material. This raises the suspicion of a learning obstacle caused by the model teacher who made a mistake when making a didactical design (didactical learning obstacle).

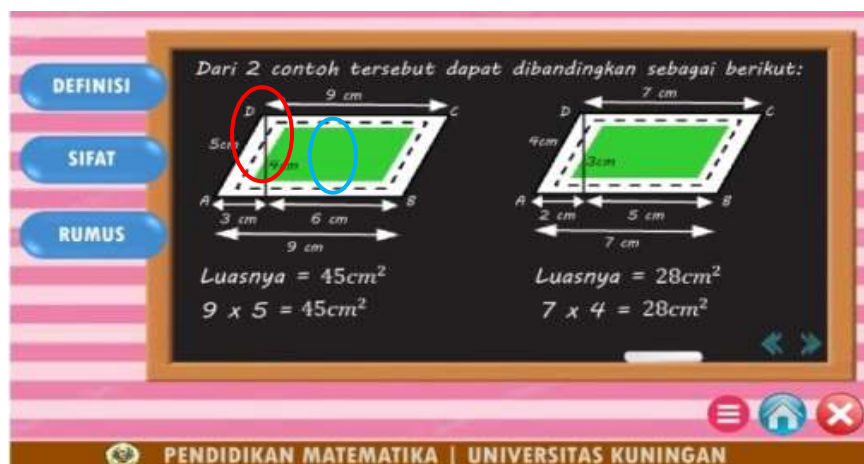


Figure 5. Wrong in determining the height of the parallelogram

The picture above shows that the area of the parallelogram is 45 cm^2 which is obtained from $9\text{cm} \times 5\text{cm} = 45 \text{ cm}^2$, where 9cm is the base of the parallelogram and 5cm is the hypotenuse of the parallelogram. The correct one should be $9\text{cm} \times 4\text{cm} = 36 \text{ cm}^2$, where 9cm is the base of the parallelogram and 4cm is the height of the parallelogram. This is included in the alleged learning obstacle type didactical learning obstacle and resulted in the alleged epistemological learning obstacle type learning obstacle. According to Brousseau (1997) that the didactical learning obstacle is the obstacle caused by the model teacher who made a mistake when making the didactic design. Didactical learning obstacles carried out by teachers can have an impact on students' barriers to understanding mathematical concepts (Suryadi, 2010).

The second meeting appeared to be a learning obstacle of the didactical learning obstacle type or an obstacle related to mistakes made by the teacher and an epistemological learning obstacle or obstacle experienced by students because students did not understand the origin of the concept of the rhombus material being taught as shown in Figure 6 :

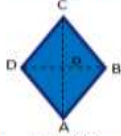
1	<p>Perhatikan gambar dibawah ini!</p>  <p>Pani memiliki sebuah kertas seperti gambar diatas. Jika diketahui $\angle DAB = 65^\circ$ berapakah besar $\angle ABC$?</p>	<p>Diketahui : $\angle DAB = 65^\circ$ Ditanya : $\angle ABC$? Jawab : $\angle ADO = \angle COD$ $55^\circ = \angle COD$ $\angle DAB = \angle BCD = 65^\circ$ $\angle DAB = \angle BCD = x$ Jumlah semua sudut dalam segiempat ada 360°. Sehingga, $\angle DAB + \angle BCD + \angle DAB + \angle BCD = 360^\circ$ $65^\circ + 65^\circ + x + x = 360^\circ$ $130^\circ + 2x = 360^\circ$ $2x = 360^\circ - 130^\circ$ $x = \frac{230^\circ}{2} = 115^\circ$ Jadi, besar $\angle DAB = \angle BCD = 115^\circ$</p>	5
			10

Figure 6. Wrong in determining what to ask

In the question section there is a picture of a rhombus, where it is known that $DAB = 65^\circ$ and is asked how large ABC is?. But in the answer section, the model teacher explained that ADO was 55° , while in the question section it was not stated that ADO was 55° . Then the resulting angle does not match what was asked in the question, this is included in the alleged didactical learning obstacle type learning obstacle and results in the alleged epistemological learning obstacle type learning obstacle (Suryadi, 2010). According to Brousseau (1997) didactical learning obstacles are obstacles caused by model teachers who make mistakes when making didactic designs. Barriers related to students'

limited knowledge of a particular context are called epistemological learning obstacles Brousseau (1997).

	$= 4 \times 5 = 20 \text{ m}$	5
	<p>Untuk mengetahui waktu yang dibutuhkan mia, gunakan rumus $v = \frac{s}{t}$, sehingga :</p> $v = \frac{s}{t}$ $4 = \frac{20}{t}$ $4 \times t = 20$ $t = \frac{20}{4} = 8 \text{ detik}$	
	<p>Jadi, waktu yang dibutuhkan mia untuk mengelilingi taman adalah 8 detik.</p>	10

Figure 6. Wrong operation of numbers

The last part of the answer the model teacher made a mistake by writing $t=20/4=8$ seconds, it should have been $t=20/4=5$ seconds. This is included in the alleged learning obstacle caused by the model teacher who made a mistake when making a didactical design (didactical learning obstacle).

In the third meeting, there was an allegation of a didactical learning obstacle type or an obstacle related to mistakes made by the teacher, as shown in the picture below:

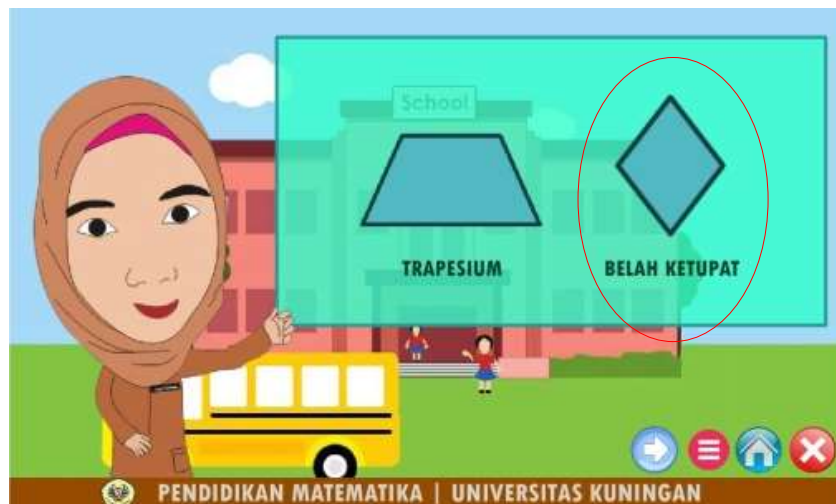


Figure 7. wrong image on trapezoid and kite sub chapter

For learning media at the third meeting, there were several errors, namely at the beginning. Where the model teacher should present pictures of trapezoidal shapes and kites, because at this third meeting the sub-chapters that will be discussed are trapezoidal

shapes and kites. But in the learning media, the teacher model instead presents a picture of a trapezoid and a rhombus.

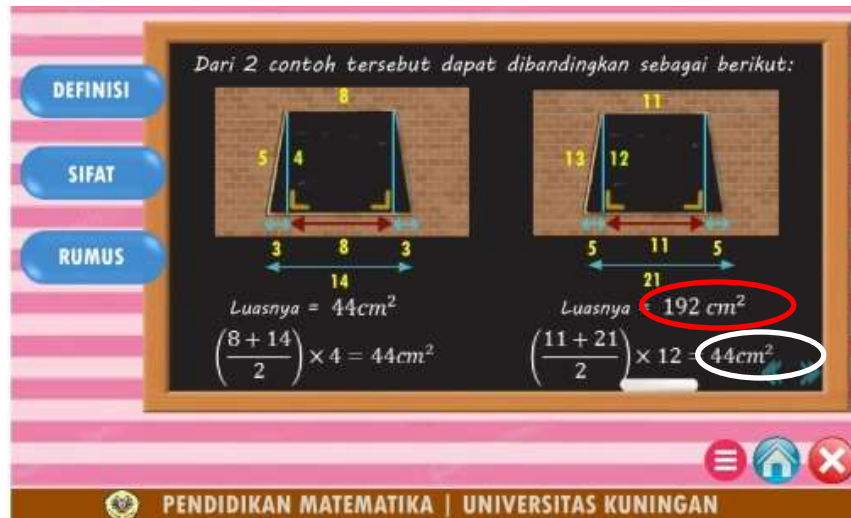


Figure 8. wrong in determining the results

When constructing the formula for the area and shape of the trapezoid, the model teacher also made an error in the results of the calculation of the area of the trapezoid. In the learning media the model teacher presents two trapezoidal figures with different side lengths and heights, in the image above it is written that the area is 192 cm², but when describing the model teacher writes 44 cm² as the result. The model teacher makes an error when operating a number, this is included in the alleged learning obstacle caused by the model teacher making a mistake when making a didactical learning obstacle (Brousseau, 1997). According to Prediger (2019) that the obstacles experienced by students during learning can be minimized by using the Didactical Design Research.

The Cause of the Emergence of Learning Obstacles during Learning Using the Didactic Design of Quadrilateral Materials in the Form of Lesson Plan with CTL Approach and Adobe Flash-Based Interactive Media

The causes of the alleged learning obstacle were: (1) at the first meeting the teacher was not careful in writing what was known in question number 2, was not careful in operating a number that has variables, and was wrong in determining the height of a parallelogram (2) at the meeting. the two model teachers were less thorough in answering questions between the questions and the results of the answers were not appropriate, were less careful in operating a number (3) at the third meeting the model teachers were wrong

in bringing up the image of a rhombus in the kite sub-chapter, not being thorough in the operation of a number.

Proposed Didactic Design to Overcome Alleged Learning Barriers That Emerge in Quadrilateral Learning with Adobe Flash-Based Interactive Media

Didactic design proposals are given to overcome the emergence of alleged learning obstacles. For the proposed meeting didactic design: (1) in the Lesson Plan teaching materials the model teacher must be more careful in explaining the answers. The model teacher must understand what is known in the problem as shown in Figure 2, so that there are no errors in the didactic design that will be used in the learning process. In addition, the model teacher must also pay attention to number operations so that there are no errors in operating a number that has a variable as shown in Figure 3 and in the learning media the model teacher must understand what will be conveyed about the concept of parallelogram so that students will not experience misconceptions during learning such as in Figure 4. This suggestion is given so that the model teacher does not make mistakes in making teaching materials, and teaching materials can be used properly to achieve the expected goals, as is the case according to (Basuki, 2012) that the purpose of learning design is to influence the development of student knowledge . (2) in Lesson Plan teaching materials, the model teacher must be more careful in explaining the answers. The model teacher must understand what is known and what is being asked in the problem as shown in Figure 5, besides that the model teacher must understand the concept of determining the sum of all angles in a rhombus, so that there are no errors in the didactic design that will be used in the process. learning. These errors can make students have misconceptions about determining the sum of all angles in a rhombus. In addition, the model teacher must also pay attention to number operations so that there are no errors in operating a number as shown in Figure 6 (3) in the learning media, the model teacher must be more careful in providing images in the trapezoid and kite sub-chapters as shown in Figure 7. The model teacher must also pay attention to number operations so that there are no errors in operating a number as shown in Figure 8. This proposal is given to correct errors in the didactic design that the model teacher made, which is in line with didactical design research according to Prediger (2019) that this research continues to develop and gradually improves itself in order to really reduce the obstacles experienced by students in the learning process.

According to An, et al., (2004) In developing lesson plans, teachers integrate their knowledge, such as subject matter knowledge and pedagogical content knowledge. Based on several mistakes made by model teachers in designing teaching materials, many conceptual errors were made by model teachers. This means that the model teacher lacks knowledge of the subject matter. According to Sumarni, et al., (2019), mastery of subject matter knowledge can be done through material deepening activities.

CONCLUSION

Based on the analysis that has been carried out as well as the results and discussion presented, it can be concluded that:

1. The didactic design made by the model teacher is in the form of lesson plans with a CTL approach and interactive learning media based on adobe flash, this didactic design is used for learning the material of quadrilaterals. Teaching materials designed in such a way aim to reduce the learning barriers experienced by students, where in this didactic design it was developed for three meetings, for interactive adobe flash-based learning media containing Competency Achievement Indicators (CAI) to be achieved during learning using learning media with the CTL approach, besides that during learning, the model teacher provides clues in the form of pictures that can make it easier for students to learn independently about the definitions, properties, and formulas of various rectangular shapes.
2. The alleged learning obstacle that appears is the didactical learning obstacle, where this obstacle is caused by the model teacher who made a mistake when making the didactic design.
3. The cause of the emergence of the alleged learning obstacle is the lack of thoroughness of the model teacher in making didactic designs and the limited references used.

The proposed didactic design given is that the model teacher should be more careful in making the didactic design, should pay more attention to the operation of a number and multiply references regarding quadrilaterals.

Suggestion. Based on the results and discussion of didactic design research for learning the material of quadrilaterals, the researcher proposes several suggestions for consideration in carrying out further research, namely:

1. The proposed didactic design can be applied to minimize the emergence of learning obstacles in the learning of quadrilaterals
2. For teachers, to be able to design didactic designs more carefully so as not to cause learning obstacles in learning the material of rectangular flat shapes. Teachers must also provide learning resources that are sufficient for students to understand the concepts of the material being taught, in addition to using only math books published by the government.

For further researchers, who will conduct research on this didactic design in order to be able to develop a didactic design for quadrilaterals in the same form (interactive learning media based on Adobe Flash) or different forms of didactic design with reference to the results of this study.

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