ICEE-2

Didactical Design to Complete the Story Questions on FPB in Elementary School

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Abstract. The aim of this research is improve students' skills in completing story question of mathemathics in the concept of the greatest common divisor (FPB) in sixth grade students in one of elementary school in Ibun, Bandung with the sample of the research are 38 students. The research method uses didactical design research (DDR). Techniques data collection used the instruments were written questions and interviews. The didactic design that is used for the greatest common factor (FPB) lesson is started from the discovery of problems in learning that is the students are difficult to complete the story questions, and then it is arranged the way to complete the story questions in the form of the Bar Model and designed alternative responses from students so that a learning design is gotten to improve student skills in completing story questions. While student activities in the learning is begun from understanding the story questions with indicators that is students can visualize in the form of bar models. The results show that the didactical design that has done be able to improve students' skills in completing story questions on FPB lesson in sixth grade so that the learning become more optimal.

Keywords : Didactical Design, Bar Model, FPB

INTRODUCTION ~ Mathematics is one of the lessons students must master from entering elementary school. As a basic level, it should be the learning of mathematics in primary schools were able to provide the provision of science corresponding student's intellectual development is needed, because the learning of mathematics in primary school, can not be separated from the properties of the development of i ntelektual students in teaching (Suherman, 2001) . Elementary school students in general, aged between 6 or 7 years, until 11 or 1 2 years. P there is this period the child is only able to think with logic if it is to solve the problem that shifts ATN at any concrete or tangible, that is by watching or doing something related to a problem-solving-problem a n it (Suyono, 2011) . Likewise in understanding a concept, students are very tied to the process of having its own meaning that students easily grasp the concept that understanding the concept can be observed students or doing something related to the concept of the . Therefore, students are only Able to complete a mass a h-mas a who divisualisas fish, and sa Ngat difficult, for him to understand the problem-mass a h that are verbal . Math Also has a character istik different with other lessons., A dapun characteristics of school mathematics basis is as follows: a. Learning mathematics is tiered (gradual). Mathematical study materials are taught in stages or in stages, starting from concrete things to abstract things, from simple things to complex things . b. Mathematical learning follows a spiral method in introducing new concepts or materials that need to pay attention to concepts or materials that have been studied by students before c. Mathematics learning emphasizes deductive mindset

mathematics is deductive science, mathematics is used deductively axiomatically (Suherman, 2001) .

In mathematics, any new abstract concepts students need to understand seg e ra by strengthening, in order to settle and survive long in the memory of the student, so that will be embedded in the thinking and actions. For this purpose, it is necessary to learn through actions and understanding, not just memorizing or remembering facts , because it will be easily forgotten by students. Teacher errors in understanding student development and the characteristics of teaching materials can be one of the causes of the emergency of obstacles in learning mathematics itself, which is called *learning obstacle*.

Learning obstacles can be caused by several factors, namely *ontogenical learning obstacle, didactical learning obstacle and epistemological learning obstacle* (Broussau, 2002) . *Ontogenical learning obstacle* is a psychological based learning difficulty, where students experience learning difficulties due to mental readiness, this obstacle is related to a child's mental development factor and will disappear on its own as the child's development. Didactic obstacles are obstacles that arise because of misrepresentations. The learning obstacle from observations made by researchers in class VI students in one of the elementary schools in Ibun subdistrict obtained information that on the FPB material there are obstacles in teaching in terms of teaching methods that are still conventional and fixed on the procedural commonly done by teachers. When solving story problems in the form of problem solving, many students experience errors in understanding the purpose of the story problems so that they cannot solve the given problem. In the process of learning mathematics a teacher should be able to maximize the process and learning outcomes, and encourage students to be active so that they can solve problems.

Solving problems in the concept of FPB is not easy, especially for elementary school students who are still in the concrete stage and have not been able to think abstractly. For this reason, a didactic design is needed that is able to support and direct the ability to answer story questions in the form of problem solving in learning FPB concepts. Considered one of the designs were didactic Researchers Able to answer that a dalah through the application *bar models. Bar models* (Widyasari, 2018) are bar models, also known as grammatical heuristics, consisting of using rectangular slats to represent numbers rather than abstract letters to represent unknowns in word problems. Figure bar model or commonly known as the Model Method which has been developed by the Singapore Ministry of Education since 1980 and has been widely used by other developed countries. This is because the modeling bar gives students a powerful way to model and

solve problems related to problem solving. . Furthermore, modeling a drawing bar can help students gain more meaningful knowledge than using mechanistic tools (Widyasari, 2018)

B models can help students think logically making it easier for them to solve a given problem. Some research on *bar models* has been done by several researchers beforehand, including (Widyasari, 2018) *bar models* are considered more interesting and more understandable for fifth grade students in solving problems encountered. The results of other studies show that students perform better after the application of the *Bar model* in solving mathematical problems (Osman, 2018) . This study can provide an alternative or guide for teachers to improve students' mathematical problem solving skills. Another researcher, Madani, et al explained that the bar model is a valuable problem solving strategy in working on word problem questions, and helps improve students' problem solving competencies (Madani, 2018) . The bar model also inspires students to be creative when answering questions because they need to draw a layout based on their understanding of the question. Research on mathematical drawings shows a positive relationship between drawing and problem solving (Hofer, 2015) (Kamariah, 2016) .

Based on the results of several studies that have been done previously which shows that the *bar model* can be a solution for solving mathematical problems, the researcher proposes a didactic study of the concept of FPB through the bar model. The focus of this research is how students are able to solve PFB concept story problems in the form of problem solving, and the subject of the research is elementary school students. The purpose of this study was to improve students' skills in solving mathematical story problems in the concept of the greatest common factor (FPB) in grade VI students in one elementary school in Ibun District, Bandung Regency .

RESEARCH METHOD

This type of research is didactical research design (*didactical Design Research*). Didactic research consists of three stages (Suratno, 2016) , (Sugiyono, 2015) as follows:

1. Didactic situation analysis before learning in the form of hypothetical diactic design and pedagogical didactic anticipation (ADP).
2. Didactic-pedagogical situation analysis or metaphorical notical analysis.
3. A retrospective analysis that links the results of a hypothetical didactic situation analysis with the results of a non-tactical methodology analysis.

The focus of the activity in this study examines *learning obstacles* in solving mathematical problems on the concept of FPB to design a didactic design that can overcome these *learning obstacles* . For

this reason, researchers limit only the analysis of didactic situations and analytic metaptive analysis. The subjects of this study were students of class VI in the odd semester of 2019/2020 school year. Determination of the subject in qualitative research is done by *purposive sampling and snowball sampling* (Suryadi, 2010) . The instruments used in this study were interviews and tests, while data processing consisted of descriptions.

RESULTS AND DISCUSSION

The purpose of this study was to improve students' skills in solving mathematical story problems in the concept of the greatest common factor (FPB) in grade VI students in one elementary school in Ibun District, Bandung Regency .

Table 1. Research result

Learning Obstacle	Before the Implementation of Didactic Design with *Bar Models* (Initial test)	After the Implementation of a Didactic Design with a *Bar Model* (Final Test)
Type 1	Students are not able to determine the concepts that must be used to solve story problems	Students are able to determine the concepts that must be used to solve story problems
Type 2	Students are not able to complete the count in the story problem	Students are able to complete counts in story problems
Type 3	Students are not able to solve the problem given in the problem story	Students are able to solve problems given in story problems

As for what is meant by the application of the existing *Bar model* in this didactic design is the students answer the question of the story by drawing / visualizing it into a rectangular bar , then entering the logic of the child's thinking in solving the problem presented. From the changes in the abilities of students shown in this study, it shows that the didactic design with the *Bar model* can help students in solving mathematical story problems in the concept of FPB in Mulyasari Elementary School students .

One of the factors that causes the *Bar model* can help students overcome the difficulty of solving mathematical problems including the *Bar model* students can visualize the problem making it easier for students to understand it. Visualizing will help students to concretize problems in story problems that are considered abstract beforehand . This is in line with Piaget's theory which states that children of class VI are only able to solve concrete or concrete problems (Suherman, 2001) .

CONCLUSION

Based on the data and discussion in this study, it can be concluded as follows:

1. Learning obstacles in solving story questions on FPB concepts In learning mathematics in solving story problems FPB concepts are grouped into 3 types of difficulties, type 1, namely students who experience conceptual obstacles, where students do not know what concepts are needed in solving the story problems , type 2 is students experience procedural obstacles, where students experience obstacles in the steps of completing the count in the concept of FPB, and type 3, namely obstacles to problem solving, where students experience obstacles in connecting the concepts they have with the problems given .
2. Didactic design that is arranged to overcome *obstacle learning* is by using the *Bar model*
3. The results of didactic design implementation with the use of the *Bar model* proved to have overcome the *learning obstacle* in solving mathematical problems on the concept of FPB.
4. *Model bars help students to concretize abstract problems by visualizing.*

Suggestions that need to be considered based on the results of this study are that this didactic design can be used as a reference for improvement in mathematics learning, but many factors affect the results of the implementation carried out, so it needs to be adjusted to the existing conditions. This research in particular about the *Bar model is* expected to continue to be developed so that it can be utilized in other mathematical concepts.

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