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Comprehending Relations and Functions: Introducing and Demonstrating Papan Resi Teaching Aid

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Abstract

The teachers need help to convey the differences between relations and functions and to make concrete examples. The purpose of the community service team is to help students find and comprehend the theory and concept about relations and functions material for grade 8 by introducing and demonstrating *the Papan Resi* visual aid.The service held in SMPK Aloysius Niki-Niki, Timor Tengah Utara District, Nusa Tenggara Timur. The service method is based on action research: planning, action, observation, and reflection. The data are collected based on the audiences' observation sheets and response sheets. Data analysis used data triangulation. The results of this community service are that introducing and demonstrating Papan Resi could be beneficial for increasing students' comprehension of SMPK Aloysius Niki-Niki. The constructivist situation influences it, and the service needs to be held for other teaching aids.

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INTRODUCTION

The development of the thinking process of students in junior high school-age transform from concrete operation thinking to formal operation thinking (Aini & Hidayati, 2017; Nurhidayah, 2018). In this case, the students need the matter which could be contextual since their brain system process concrete information easily. The students would benefit from real representations of their thinking process (Vogt et al., 2020). Representation using teaching aid gives a powerful way for students leading to abstract mathematical ideas (Mainali, 2021). Developing this strategy early gives students tools for progressively thinking about abstract concepts (Lestari et al., 2021; Yangiboyevich et al., 2020).

Visual aids are devices that present information through auditory or visual stimuli to aid learning (Mulyadi et al., 2018; Shabiralyani et al., 2015) and as the resources that contain information learners can see (Sudarshana, 2017). Visual aids help learners concretize the information to be reasonable and make learning practice real, active, and vital. Not only learners,

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visual aids or teaching aids help teachers arrange the matter of lesson turn to be relevant to the student's needs so the learning instruction can be fulfilled (Shabiralyani et al., 2015).

The never-ending-learning mathematics teachers typically use visuals, manipulation, and motion to enhance students' understanding of mathematical concepts. The US national organizations for mathematics, such as the National Council for the Teaching of Mathematics (NCTM) and the Mathematical Association of America (MAA), have encouraged teachers or tutors to make various representations for learning mathematics (Boaler et al., 2016). The situation commonly encourages students, as constructivists, to construct their meanings rather than simply memorizing someone else's. This finding by students resulted from a guided or constructivist approach and paved the way for introducing logarithmic models (Bukari & Yakubu, 2018). Yet another reason that visual mathematics should be used in schools to a greater extent is the nature of the knowledge needed for today's high-tech world (Boaler et al., 2016). Years ago, workplace knowledge was based on words and numbers, but the new knowledge of the world is based largely on images that are 'rich in content and information'(West, 2004).

Mathematics is a broad subject that requires rules and analysis, so it needs to be training, exercising, and thinking (Hijriani et al., 2022). It should test the student's mind and thinking. It requires painstaking effort to facilitate the level of understanding of the subject and treats the low level of students' knowledge in the face of the material. In general, teaching aid can help the teacher facilitate a better understanding of the subject, discouraging the act of confusion (Nurrita, 2018). It makes the subject and every aspect of the lesson clear and makes them successful in mathematics (Alshatri et al., 2019).

Research and service on visual aids have been carried out, such as blackboard teaching aids for multiplication (Wahyudi, 2019), Venn diagram walls (Prihatiningtyas et al., 2019), positive negative blackboard teaching aids (Susiaty et al., 2021), blackboard teaching aids fractions (Fadilah et al., 2021), dakon board teaching aids for integer operations (Nugrahanta et al., 2016). However, none of these studies have developed and used blackboard visual aids for relations and topics.

Concerning the topic of relations and functions, the students in SMPK Aloysius Niki-Niki need help to differentiate relations and functions and to comprehend concrete examples. The visual aid Papan Resi provides the proper simulation for relations and functions. The props have two sides for the topic of relations and the topic of functions as well as a collection of examples of problems that are then drawn to distinguish relations and functions. According to the situation and the benefit of visual aids, the community service group provides a program to introduce and demonstrate Papan Resi to students in SMPK Aloysius Niki-Niki.

METHOD

Service activity was carried out at SMPK Aloysius Niki-Niki as a partner in service activity. The participants in the service activity were the 7th-grade students of SMPK Aloysius Niki-Niki.

The method of implementing service activity is carried out by adopting action research steps consisting of four stages: planning, action, observation, and reflection. The activity carried out at the planning stage are (1) Socialization of service programs to the school as a partner; (2) making teaching aid; (3) Tutoring of teaching aid simulation from lecturers to students; and 4) service programs preparation.

The next step was to implement a service program, namely the socialization of the Papan Resi math teaching aid. During the implementation of the action, observation was made. The observation was made during the teaching aid demonstration process assisted by mathematics education students at Universitas Timor. The instrument used is field notes. Some of the things that were observed were the obstacles and weaknesses that emerged during the demonstration process. The demonstration is held for two days.

The last stage is reflection. The steps that are held in the reflection stage are: (1) Evaluating the obstacles and weaknesses that arise in the demonstration of the Papan Resi demonstration tool; and (2) the results of the evaluation are used to correct the deficiencies that exist in the learning media (Fadillah et al., 2017).

The instruments in this study are observation sheets and response sheets from the audiences. The researchers analyzed the data by the triangulation method.

RESULTS AND DISCUSSION

RESULTS

The following describes the activities carried out in each stage of the service method that refers to action research.

Planning

The first activity carried out at the planning stage was the socialization of the service activity program to a partner school, SMPK Aloysius Niki-Niki. The socialization was carried out in coordination by inviting partner school principals and mathematics teachers at SMPK Aloysius Niki-Niki regarding the program's planning. The meeting aims to confirm the material and work system of the teaching aid that will be presented following the initial observation data.

The second activity is making teaching aid. Tools and materials needed in making teaching aid are scissors, pencil, marker, paper glue, double tip, laptop, printer, cutter, pins, 2 boards, 2 sheets of HVS paper, 10 sheets of manila paper (colors), 3 sheets of origami papers, used pen, used cardboard. Here is how to make the Papan Resi teaching aid based on Figure 1.

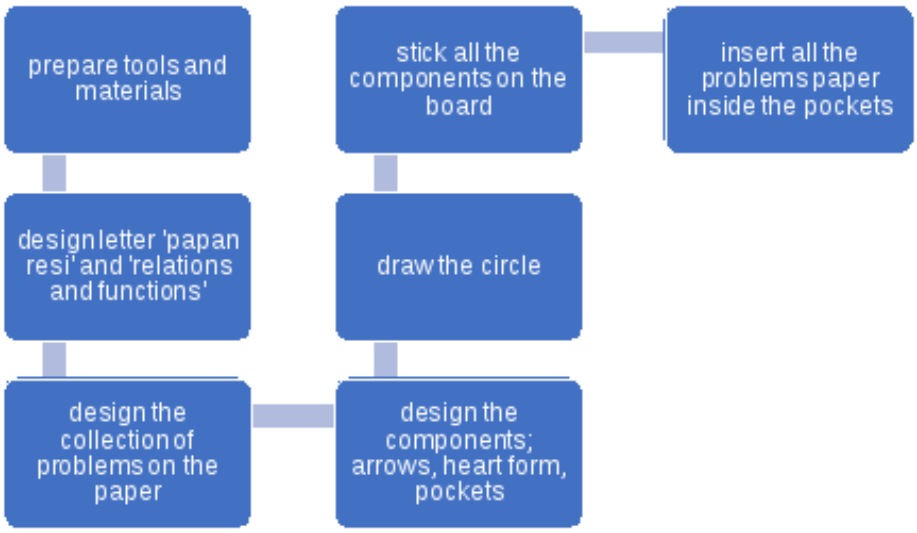

Figure 1. The Flowchart of Teaching Aid

Based on the process of making a teaching aid, the aid is like the following figure. Each of the components on the board has a unique function.

Figure 2. Papan Resi Teaching Aid

The next activity in the planning stage is tutoring by the lecturer to the college students. College students, as part of members of the service activity, also provide a simulation of teaching aid to students. Tutoring aims to ensure the concepts used and simulate teaching aid properly.

Action

After the planning is carried out well, the action stage is carried out. Action in service activity is a program implementation. The activity carried out in the program implementation are demonstration activities for teaching aid to SMPK Aloysius Niki-Niki students and simulation teaching aid by students. The activity carried out in dedication are: (1) Introduction to the teaching aid of Papan Resi with its parts, (2) Explain how to use the Papan Resi teaching aid, (3) provide opportunities for students to try the Papan Resi teaching aid, and (4) draw conclusions about the relationship between relation and function and teaching aid used. This activity was carried out on 20-21th May with 60 students divided into three rooms.

Figure 3. Simulating Papan Resi by Students

Here is how to use the Papan Resi teaching aid: 1) Turn the circle. After the circle rotation stops, look at the number designated by the arrow. 2) the number designated by the arrow is used to select the questions in the bag. 3) Take the problem in the bag containing rules of relation and function and members of sets A and B for relation and function. 4) Install members of set A and members of set B in two rectangles in the related section using the pin needle, then read the rules, then connect set A and set B using arrows. Do the same thing in the function section. 5) After being connected, the next step is to explain the difference between the relation and function.

Teaching aid will be simulated by lecturers and college students who will then be called tutors by students. Participants in the socialization will be divided into three rooms. Socialization participants will be accompanied by two tutors and two observers in each room.

Observation

In the implementing dedication activity process, the service team who served as an observer observed the activity process and students' responses. The eminence of this teaching aid is easy to use for the children. After simulating by the tutors, the students can simulate by themselves.

Besides, there are obstacles, such as students who need help understanding the tutor's purpose in explaining how to use the teaching aid. Constraints in the use of language that are difficult for some of these students to understand. Students also feel ashamed to ask the tutor. But most of the students responses were very enthusiastic when they explained how to use the teaching aid. This is indicated by the presence of students who can conclude correctly about the concept of relation and function.

The second obstacle is the usage of teaching aids. At the same time, when we want to change examples of cases, the tutor must tidy up the piece of paper for cases example, which takes time, so students have to wait.

Reflection

Based on these obstacles, the dedication team made a reflection. The first obstacle, regarding language and being ashamed to ask, can be done by forming peer tutoring. Peer tutoring can minimize language gaps and can teach each other between friends. This is also a consideration regarding using the learning model in teaching aid. The second obstacle is in terms of teaching aid. It can be modified by replacing paper pieces with a problem card from HVS paper and then dinged on a teaching aid board.

DISCUSSIONS

Based on the participant's responses, the participants were enthusiastic, full of spirit, and felt that the socialization activity and the teaching aid were useful. In other words, the teaching aids satisfy the main function of aid: attracting attention (Arsyad, 2015). The teaching aid successfully directed students to pay attention to the topic discussed. This finding shows that in terms of knowledge, the service activity increased the understanding of using teaching aid and the material due to the simulation in compiling and using teaching aid. Using teaching aid will impact the achievement of students' learning outcomes (Susanta et al., 2021). The same view (Wahyuningsih, 2020) shows that the usage of teaching aid can increase student learning activity. This finding is in line with the finding made by (Azmi et al., 2019), which states that participants who take part in training in the preparation of teaching aid get additional knowledge and skills about how to make and use teaching aid in learning mathematics. Another important thing is the teaching aid could be showed a clear and tangible mathematical concept (Annisah et al., 2014).

CONCLUSION

The conclusion of this service activity is as follows: the service for introducing and demonstrating Papan Resi could be beneficial for increasing students' comprehension of relations and functions topics at SMPK Aloysius Niki-Niki. The constructivist situation influences the service needs to be held for other teaching aids.

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