

Implementation of teaching materials using a realistic mathematics education approach in PGSD student concern for the environment

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Abstract. The main problems in this study are the lack of awareness of PGSD students towards the surrounding environment and the lack of RME-based teaching materials that use used goods as a medium of learning. The long-term goal of the research to be carried out is to support the improvement of quality and the development of basic and regional education policies at the local and national levels through the improvement of the quality of the young generation of productive Indonesian hopes. The specific target of this research is to get a picture of the results of the implementation of teaching materials "learning mathematics in elementary school". The focus of this research problem is: 1) learning steps using the teaching material and 2). Obstacles felt when learning to use these teaching materials. And 3). Implementation of teaching materials uses a realistic mathematics education approach in learning awareness of the environment of PGSD students with the help of teaching aids made from used goods. The method used is the qualitative description, this study describes how elementary mathematics learning teaching materials, implementation of elementary mathematics learning teaching materials in caring for the environment of PGSD students and obstacles in implementing teaching materials. The results of this study are the steps in the implementation of elementary school mathematics learning teaching materials in learning environmental care for PGSD students.

1. Introduction

Mathematics Learning is one of the teaching materials that is very important for our daily lives. It can be seen that all daily activities are always related to the world of mathematics [1-9]. According to de Lange [10], mathematics can be seen as the language that describes patterns - both patterns in nature and patterns invented by the human mind. Those patterns can either be real or imagined, visual or mental, static or dynamic, qualitative or quantitative, purely utilitarian or of little more than recreational interest. They can arise from the world around us, from the depth of space and time, or the inner workings of the human mind. From the data explanation, we can see that mathematics consists of abstract and concrete concepts created from patterns that exist in nature or patterns created by humans.

In life everyone will always be associated with mathematics, ranging from simple things to complicated things. Problems that occur from mathematical problems and attitude problems in mathematics. Many problems that occur around us are not only mathematical academically but also affective. Cognitive problems that often arise, for example, low ability to solve problems, lack of understanding ability of students, the decline in students' mathematical thinking abilities, and much more. This is also in line with the affective problems that exist in mathematics learning, among others: the lack of student self-condensation, student motivation, caring for the student environment and more.



One of the problems that researchers see that occurs at IKIP Siliwangi, especially in PGSD study programs is the lack of awareness of students about caring for the environment [11]. This can be seen in some situations, first, some students sometimes do not throw rubbish in their place, secondly, students do not seem to care about the environment around them whether there is a lot of rubbish littered or not, thirdly the lack of student knowledge of inorganic rubbish that we can recycle to become more useful goods.

This is in line with the learning objectives of mathematics according to Curriculum 2013 [12] namely: increasing the special intellectual abilities of high-level students, shaping students' abilities in solving problems systematically, obtaining high learning outcomes, training students in communicating ideas, and developing student character. From the above explanation that the benefits of us learning mathematics are not only cognitive or knowledge and affective or attitude. In line with Henderina [13] revealed that mathematics as part of the curriculum in schools can also play a role in instilling environmental-oriented values to students through implementation in learning both in the aspects of knowledge (cognitive), awareness or will (affective) and action (psychomotor).

Akbar [14] explain that there are many problems in primary school that must be immediately addressed, namely related to the still low character of students caring about the environment and the character of responsibility on students. This also happened to prospective elementary school teacher students. According to Uno [15] which states that instilling awareness and understanding of the importance of protecting the environment can be done through education. In this case, the role of education can provide understanding and habituation so that students can care about their environment. This will have an impact on the inculcation of environmental care characters that they will bring when they teach in elementary schools. Through the inculcation of environmental care characters, students can understand that environmental destruction activities will hurt humans [16].

On July 5, 2005, the Minister of Environment and the Minister of National Education issued a joint decree number: Kep No. 07 / MenLH / 06/2005 No 05 / VI / KB / 2005 for the development and development of environmental education. Then there was an update on February 1, 2010, where the main objective of this agreement was that the Environmental Education could be integrated into the national curriculum so that students could become environmentally friendly.

Many efforts must be made to instill awareness of environmental care for PGSD students, including providing organic, inorganic trash bins, providing knowledge about recycling used items, or providing teaching materials that contain mathematics learning that can utilize used goods as a medium. The learning that we design must be close to our daily lives in order to be more meaningful. In addition, the use of media made from used goods also has a real impact on mathematics learning. Based on the "reality" RME principle, the learning process must be started from contextual issues to build its creativity. Realistic mathematics education rated adaptation of contextual issues and coupled with less utilization of real media learning to create a learning mathematics meaningfully [17]. Students can interact and communicate their ideas. Therefore, RME is required specifically for elementary school students [18]. This confirms that RME-based teaching materials are indeed highly recommended for elementary students. Therefore, as prospective elementary school teachers must be equipped with teaching materials based on RME mathematics learning.

Teaching material is a set of material that is arranged systematically both written and not to create an environment/atmosphere that allows students to learn [19]. The teaching material in this study is in the form of printed teaching materials in the form of Student Worksheets (LKM). The scope of teaching materials to be produced includes (1) Title of Teaching Materials; (2) Learning Indicators; (3) Learning objectives; (4) Description of Material; (5) Learning Activities; and (6) Student Activity Sheet. Good teaching materials are started by building students' knowledge based on experiences in daily life to find a mathematical concept [20]. Modules are an important component in learning because they are used to help obtain information on the subject matter [21].

The following explanation confirms that teaching material is one of the media or avenues in learning to achieve certain goals. Teaching materials should also be arranged systematically and structured to make it easier for readers to understand certain material. Teaching materials are also equipped with teaching materials, group worksheets, individual worksheets, and evaluations. This is done so that the

teaching material we compile does not only contain material content but also a measuring tool to determine the success and achievement of a learning goal.

Sunismi [22] explain that Learning materials compiled by the Realistic Mathematics Education (RME) approach, begin with the submission of problems related to the real world of students. Through real-world problems that are known to students, students can find concepts or principles learned so that students will better understand the concepts/principles learned. Teaching materials that are designed are initiated by contextual problems that are close to daily life. This is done so that they feel close to the problem and need to solve that problem. With this problem, they were invited to find their concept.

Therefore, researchers would to research the implementation of instructional materials approach using realistic mathematics education in concern for the environment of elementary school teacher education students. The results of this study are expected to instill the concern of PGSD IKIP Siliwangi students in particular and all IKIP Siliwangi students in general.

2. Method

This research is a qualitative descriptive study that aims to find a description of the situation as objectively as possible about the condition of the class with all its characteristics. According to (Suyitno 2018) Description research is research that aims to describe a symptom, event, event that occurred in class at the time the research was conducted. In this study, researchers tried to describe all the events that became the center of attention when the research took place. Descriptive qualitative research is a research method based on the usual post-positivism philosophy. Used to examine natural objective conditions where the researcher acts as a key instrument. In this descriptive study, the teacher/researcher objectively describes the ability of students, ways of student learning, student interest in learning, and so on.

The subjects in this study were PGSD IKIP Siliwangi 2018 Class A1 students totaling 35 female students and 5 male students. The students were divided into 3 categories: 1). students who are active and interested in everything new. 2). Students who can follow the instructor's instructions in learning. 3). Less active students. The instruments used in the study are 1). Questionnaire to measure the description of concern for the environment, 2) observation to see the learning situation using teaching materials, 3) interviews to dig deeper information from students about learning to use teaching materials in learning environmental exceptions.

3. Results and Discussions

This study uses descriptive qualitative research in which researchers are required to explore data based on what was said, felt, and carried out by data sources. In qualitative research, the researcher is not as it should be what is thought by researchers but based as it happened on lap thinking, experienced, felt, and thought by the data source. By researching a descriptive approach, researchers must describe, explain, describe the data obtained by researchers through interviews with informants, as well as through observations and test results.

In planning, this research will be conducted in the classroom in elementary mathematics learning courses. But the plan of this research activity will be carried out to appear Corona Virus Disease or better known as COVID-19. During a pandemic that is felt by the whole world, especially Indonesia. All those involved in the world of education carry out Home Study. This resulted in this research being carried out online with class 2018 class A1 students. This research takes place by using Google Classroom, Google Meet, and Zoom.

This research lasted for 1 month in 4 meetings online (online). There are several materials discussed in 4 of these meetings, among others, learning to get up flat and build space for elementary students. Before researching class, our research team made preparations such as, in consultation with the Supervising Lecturer of the course, Prof. Jozua Sabandar. We have discussions online about the research we are going to do. Also, we also prepare and arrange teaching materials that will be given to students. We provide these teaching materials when learning takes place as a guide and reference in learning.

Each meeting is divided into 3 sessions, the first is an exploratory session, in this session the lecturer provides an overview and simulation of how to provide mathematics instructors for elementary students for certain materials. The second session is the Design stage, students are invited to make or modify

examples of learning mathematics, by changing the steps of learning, media, or learning resources. This design stage is done outside the network (offline), students design learning media and how to apply them in learning. The last stage is Allot, students are asked to share the results of their designs to social media so that they can be seen by the lecturer and his friends especially and all people in general. the stages above we can call the EDA (Exploration, Design, and Allot).

At the first meeting, researchers conducted online learning using Google Talk on Monday, April 6, 2020, at 13.00-14.40. The initial step of learning discusses the identification of square, rectangular, square, and circle shapes. Before the first meeting, we already gave information to students to bring used items such as used food boxes, used plastic drinks, and tools such as scissors, rulers, and terms. Students are given directions on how to teach flat figure identification materials to elementary school children. The lecturer invites students to observe objects in the shape of a square, triangle, circle, and rectangular shape. Not only that, but they were also asked to work on Worksheets on the identification of flat shapes. Making various kinds of flat shapes from used cardboard materials is also recommended by lecturers. How can they change useless material into meaningful? After the lecturer explains material on the flat wake, students are required to create and change the media that has been demonstrated in the lecture online. Student creativity is needed here because they are required to innovate in making learning media from materials that are not used anymore. Their work must be shared with social media in the form of interesting learning videos. In this pandemic period, this is one way to evaluate the learning we have given. Besides, this is also very useful for other colleagues who need information about the media of mathematics learning. These activities are carried out until the 4th meeting with different material each week.

The obstacle felt by researchers in carrying out online and offline learning in this pandemic period is the unstable signal constraint. PGSD IKIP Siliwangi students based on various blood in West Java and surrounding areas. The situation and conditions that are different in each of these areas also greatly affect the smoothness of this study. Sometimes some students have to relocate when conducting lectures online. This is indeed a new thing and we must be accustomed to adapting to technology that makes it easier for us to learn in this pandemic. Lecturers and students are also still groping in using the Video Conference application which is our media in this research. For this reason, we try first before carrying out research. In this case, IKIP Siliwangi makes it easy to access Google Meet by using a campus-affiliated email account.

Table 1. Descriptive statistics of PGSD students' environmental concerns

Score	N	x-min	x-max	\bar{x}
Pretest	40	65.50	82.25	72.51
Posttest	40	81.32	90.41	86.59
Gain	40	2.06	18.27	8.36

Table 1 shows that the research subjects used were 40 students consisting of 35 female students and 5 male students. The tests consisted of pretests that were submitted before treatment and posttests carried out after treatment. Can be seen a significant increase from the average value of the pretest 72.51 to 86.59. Judging from the lowest pretest score is 65.50 while the maximum score is 82.25. The minimum posttest score obtained was 81.32 while the maximum posttest score was 90.41. can be seen as a caring attitude towards the environment of PGSD IKIP Siliwangi students.

From the questionnaire distributed to students, overall using these teaching materials has instilled a caring attitude towards the environment. This can be seen from the use of learning media made from used goods or rubbish. They realize that inorganic waste is difficult to decompose in a short time. Therefore, the use of mathematics learning media from used goods is very good for the environment. Learning media that we can get and find around us, is not necessary and requires expensive costs as long as it is precise and meaningful. In choosing the media, we also have to pay attention to several things, according to KD, not expensive, harmless, and easy to obtain. This we can prove by making media from materials that are felt to be used again, but when designed properly can be very useful.

In the implementation of learning using teaching materials elementary school mathematics learning as a whole has been running smoothly and quality. Teaching material based on Realistic Mathematics Education is indeed very useful for prospective elementary school teachers because they are equipped when they enter elementary school. The lecturer was also active in giving a picture of how to teach some elementary mathematics material. This is in line with the Manopo opinion [23] that Teachers are advised to pay attention to each activity so that all students are actively involved in learning. Students are also active in making and creating their creations according to the ideas they have in designing media-assisted mathematics learning from used goods. In accordance with opinions Students can interact and communicate their ideas. Students communicate the mere idea k a search for learning design and media as diverse as each student has different ideas and unique.

There are several obstacles in the implementation of learning using this teaching material, among others, the constraints of facilities and infrastructure that support the implementation of this online learning. This is in line with Pangondian [24] which states that among the factors that are the main key to the success of learning in the network is the existence of facilities and infrastructure. According Rusdiana [25] University and lecturer support is an important factor that supports the success of online learning. This has been done by IKIP Siliwangi by supporting lecturers in implementing online learning and facilitating lecturers to easily access Virtual applications for learning. Harjanto [26] explain that Online learning is a process of transforming conventional education into digital form so that it has its challenges and opportunities. The existence of obstacles in the learning process can reduce student interest in learning [27].

Care for the environment is an attitude held by someone who seeks to improve and properly manage the surrounding environment so that the environment can be enjoyed continuously without damaging the situation, as well as maintaining and preserving so that there are sustainable benefits. Indicators of the character of caring for the environment [28]. According to the Ministry of National Education [29] are for classes 1 to grade 3 focused on defecation and urinating activities in the toilet, throwing rubbish in the trash, cleaning trash scattered in the schoolyard, not picking at random in school parks, always maintain cleanliness in schools, while students in grades 4 and 5 focus on cleaning toilets, trash cans, the school environment, using plants to beautify classrooms and schools, and also taking care of parks in the school grounds. From the description, we can convert them to PGSD students. In fact, PGSD students must be able to implement all the indicators. Furthermore, PGSD students are able to develop learning media from materials that can no longer be used. This is considered relevant to their role as prospective elementary school teachers.

4. Conclusion

The conclusion of the research that we have done is the existence of elementary school mathematics learning materials based on the Realistic Mathematics Education approach in elementary mathematics learning courses that can instill the character of caring for the environment of PGSD students. Learning by using these Learning Materials is going well even though it is running online. The obstacles that occur are related to the signal quality of each different student because they conduct online lectures from various regions.

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6. References

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