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Learning statistics using realistic mathematics education: A case of fifth-grade students of elementary school

Astri Widyanthi[1], Fatmawilda[1], Zetra Hainul Putra[1*], Jesi Alexander Alim[1]
[1]Department of Elementary Education, University of Riau, Pekanbaru, Indonesia

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ABSTRACT

This study aims to describe realistic mathematics education (RME) in helping students' understanding of concepts in statistical material about data collection. This research uses descriptive qualitative research methods with a design research approach. The subjects of the study were 29 fifth-grade students of a public school in Pekanbaru, Riau, Indonesia. The results of this study show that RME is applied in learning with the following steps, namely first, providing and explaining contextual problems to be solved by students; second, students solve contextual problems for mathematical models in their own way; third, discuss and compare each problem solving given by students; Fourth, students conclude and summarize the learning concept. From these activities, students can develop knowledge and skills in collecting and presenting data.

Corresponding Author:

Zetra Hainul Putra
Department of Elementary Education, University of Riau, Pekanbaru, Indonesia
Email: zetra.hainul.putra@lecturer.unri.ac.id

INTRODUCTION

Mathematics plays an important role in the advancement of education because mathematics is considered an expert who underlies the birth and development of other sciences (Kasri, 2018). Mathematics is always applied to everyday life, a person's way of thinking becomes more critical, logical, analytical, systematic and creative, which can be used in finding solutions to a problem. That's why it's important to teach maths to someone who is in elementary school. Students find maths challenging, so teachers need to choose the right strategies to keep students interested and understanding about what is being taught to them. Mathematics is considered the father of knowledge, inseparable from its role in the development of other fields that need to be taught from elementary to higher education (Kusumaningpuri et al., 2022).

Mathematics learning also includes improving the quality of education, so that it can also improve the quality of human resources. The most studied topic in mathematics is statistics (Iranti et al., 2023; Maya &; Setiawan, 2018; Winanda, 2020). Statistics have a role in advancing a country, which is important to be taught at the school level (Maghfiroh &; Rohayati, 2020). Statistics is one of the branches of mathematics that involves the process of collecting, processing, examining data, and drawing conclusions from the results of data analysis. Where statistics are

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useful for processing decisions based on accurate data. Statistics play a large role in everyday activities such as measuring height and weight, shoe size, math scores, male and female student enrollment, and the percentage of the occupational population by collecting, reading, presenting, and analyzing data. At the elementary level, statistics material is taught in stages from grade IV (Kusumaningpuri et al., 2022). In this study took statistical material grade V elementary school about the frequency of events (mode) by presenting data. In class IV the material is still in the form of preparing students to read data, and in class V the material includes collecting and presenting data. At this level, students should not only be able to read the data, but also be able to collect data by various methods and present it in various ways. In Class VI, material related to mode, median, and mean will be discussed.

Realistic Mathematics Education (RME) is based on the philosophy *of mathematics as human activity* (Sari & Yuniati, 2018). In addition, mathematics learning with the RME approach is teaching that focuses on problems that students can imagine as problems in real life (Sari &; Yuniati, 2018). RME is a model that refers to real-life contexts as a source of learning. In addition, RME is a mathematical learning model that uses real-world conditions (Mukrimatin et al., 2018). A realistic mathematical approach model that uses real situations and objects associated with the learning process will make it easier for students to memorize mathematical learning concepts supported by research (Maulana et al., 2023). This study shows that the use of RME can increase the understanding of concepts, creativity, and character development of elementary school students which is also supported by research (Supriatna et al., 2021). The results of this study concluded that RME was able to develop the ability to understand concepts in grade V elementary school mode material.

METHOD

The research approach in the paper is descriptive qualitative. The main purpose of descriptive qualitative research is to provide an accurate picture of the description or picture of the status or characteristics of a situation or phenomenon (Johnson &; Christensen, 2020; Kim et al., 2017). Descriptive qualitative research does not aim to find cause-and-effect relationships, but rather to describe the variables that exist in a situation and, sometimes, describe the relationships that exist between these variables (Johnson &; Christensen, 2020; Putra et al., 2023). Therefore, this study uses descriptive qualitative because it aims to describe the application of realistic mathematics education (RME) in helping students' understanding of concepts. What researchers do is observe and teach. Data on understanding concepts before the application of RME were taken during observation and after the application of RME were taken after teaching.

The research subjects in this study were VA class students at a state school in Pekanbaru. Participants amounted to 29 students taught by the researchers themselves.

RESULTS

The following are presented the results of the implementation of RME that has been implemented:

1. **Provide and explain concept understanding problems for students to solve.**
   Researchers provide an understanding that can be imagined by students with their respective groups, namely "*Dalam kehidupan sehari-hari kamu selalu membutuhkan informasi. Informasi kegemaran teman temanmu, tanggal ulang tahun, banyak anggota keluarga, tinggi badan, berat badan serta berbagai informasi lainnya.* Teacher Q&A to students in class, "*Informasi tersebut dapat kamu peroleh dengan cara?"*.

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Students solve concept problems with their respective groups. The whole group discussed, Then the students answered *"dengan cara bertanya dan berhitung",* The teacher gives reinforcement, namely "*Informasi tersebut dapat kamu peroleh dengan bertanya, berhitung, mewawancarai atau mengamati. Informasi yang kamu peroleh memberikan kemudahan dalam membuat suatu tindakan atau keputusan, misalnya kapan kamu akan memberikan hadiah dan apa jenis hadiahnya*".

Provide and explain contextual problems for students to solve. The teacher conveys problems to students, namely "Buk Astri memberikan hadiah dalam rangka syukuran, dengan membawa 100 permen beraneka rasa yaitu rasa jeruk, mangga, leci dan anggur. Candies with 4 kinds of flavors can be seen in figure 1 below.

Figure 1. Candy with 4 kinds of flavors

"Bu Astri ingin tahu kira kira permen apa yang paling disukai oleh siswa, dengan disediakan 100 permen tentunya siswa mempunyai banyak pilihan dalam mengambil satu permen yang disukai. Setiap siswa dipersilahkan mengambil satu permen yang disukai dari pilihan rasa yang tersedia". Each student comes to the front of the class to choose their favorite candy, can be seen in figure 2 below.

Figure 2. Each student picks up their favorite candy

The teacher conveys to the students that *"setiap kelompok silahkan mendata permen kesukaan setiap teman pada masing-masing kelompok"*. The group has been divided into 4 groups; each group consists of 7-8 students. The teacher explains the problem by asking questions "*Apa rasa permen yang paling banyak disukai teman sekelasmu? Setelah mendapatkan data, coba sajikan hasil data yang telah dikumpulkan sehingga mudah dipahami oleh kelompok lain*". Whether or not students understand the meaning of the problem.

2. Students solve mathematical contextual problems in their own way.

The whole group discussed in class with their respective groups. Students look for data in each group which can be seen in figure 3 below.

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Figure 3. Students search for data in each group.

Some groups discuss well but there are groups whose students do not discuss or are silent, can be seen in figure 4 below.


Figure 4. Students discuss in presenting data in the form of diagrams.

3. Discuss and compare each problem solving given by students.

At this stage all groups explain their own methods, with the conclusion that each group understands by making a bar chart.

"Kelompok 1 menyampaikan hasil diskusi bahwa yang memilih cerry 8 orang, anggur 8 orang, manga 8 orang, jeruk 6 orang".

"Kelompok 2 menyampaikan hasil diskusi bahwa yang memilih cerry 6 orang, memilih anggur 8 orang, mangg 7 orang, dan jeruk 8 orang"

"Kelompok 3 menyampaikan hasil diskusi bahwa yang memilih anggur 7 orang, cerry 7 orang, mangga 7 orang, dan jeruk 8 orang"

"Kelompok 4 menyampaikan hasil diskusi bahwa yang memilih anggur 7 orang, cerry 7 orang, mangga 7 orang, dan jeruk 8 orang".

It can be seen in figure 5 when students are delivering the results of the discussion.


Figure 5. Convey the results of the discussion after being made in the form of a diagram.

From the results of the discussion of each group that there are 2 groups that have different results, namely group 1 and group 2. When the teacher asked the group *"kenapa data permen yang didiskusikan berbeda dengan kelompok lainnya?"*. The group replied *"sepertinya ada kesalahan buk saat bertanya dan melihat data kepada kelompok lain, kelompok kabi terburu-buru menuliskannya"* The next group replied *"kami tidak teliti saat melihat data, bahwa data yang ditulis tidak sesuai urutan yang kami buat".* Teachers provide feedback *"bahwa data yang dituliskan itu dimulai dengan anggur berjumlah 7 orang, cerry 7 orang,*

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mangga 7 orang dan jeruk 8 orang sehingga jumlah seluruh siswa sesuai yaitu berjumlah 29 orang. Sedangkan kelompok 1 berlebih 1 orang siswa yaitu menjadi 30 orang siswa dan kelompok 3 dan 4 sudah sesuai dengan hasil data nya".

The teacher asked each group *"kenapa saat menyajikan data semua kelompok membuat diagram batang?"* The group each replied *"karena diagram batang menurut kami yang paling mudah dan tidak memerlukan waktu lama membuatnya"* And there was another group who answered *"kami tadi ingin membuat diagram lingkran buk, akan tetapi tidak mempunyai lingkaran atau jangka untuk membuatnya.*

4. **Students concluded and summarized learning concept**.

While teaching, the researcher asked one of the groups to conclude the learning concept at the time of the meeting and finally the students concluded the learning concept that: "*banyak rasa permen yang dipilih oleh tiap siswa yaitu pada jeruk yang berjumlah 8 orang, sehingga data tersebut di sebut modus dengan kata lain angka yang paling banyak muncul pada data".*

CONCLUSION

The results of the study concluded that the application of RME in learning is applied in the following steps. First, provide and explain contextual problems for students to solve. Second, students solve contextual problems for the development of mathematical models in their own way. Third, discuss and compare each problem solving given by students. Fourth, students conclude and summarize the learning concept. Students' understanding of concepts increases after the application of RME compared to before the application. This suggests that the use of contextual problems in EMR is solved with students' informal knowledge which will be directed towards formal knowledge of mathematics that helps students in developing their understanding of concepts. Interactivity that occurs both between students and students or students and teachers who give each other ideas and ideas in solving a problem can help students develop an understanding of the concept.

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