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Are the fractions difficult? A case study at Elementary School 033 Asmi

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Abstract. Mathematics was a subject that was required to all students, especially students in elementary schools. Mathematics was the foundation to understand and develop technology and science. One of the materials in mathematics was fractions. The material was material that was considered as the difficult material to be understood by students. The research design used in this study was a qualitative research design with the case study as its methodology. The results showed that (1) students who met the criteria standard were only 14.29%, i.e. 4 of 28 students. Whereas 85.71% was under the criteria, i.e. 24 of 28 students; (2) the difficulties learners in understanding and resolving a matter of fractions was multiplication of fractions with 29% who answered correctly, meeting fractions and integers with 21.4% who answered correctly, and mixed fractions with 39.3% who answered correctly. From these results, we can say that fractions were a difficult material to be understood by students.

Keyword. Education, Mathematics, Learning, Fractions, Qualitative, Case Study

INTRODUCTION ~ Education basically is the media that is used in meeting one of the humans' needs, i.e. learning (Lutvaidah, 2015). On one part of education, it is an effort that is made in shaping culture in an individual, but in another part, education is part of the culture itself (Supardan, 2008). People generally have known education from their parents or from their environment (Prayudi & Salindri, 2015) so it is not wrong if education has a high position in humans' life (Hasnida, 2017). Education is a medium that can be used as a tool in shaping and improving the personal qualities of every human being (Widodo, 2015) and the advancement of education of a country is the key to the progress of the nation itself (Munirah, 2015).

Education is considered as the basis in developing a country (Utami, 2019) which can shape its human qualities (Windasari & Sofyan, 2019). Education itself is formed from various elements that are related to each other (Sutrisno, 2016) which requires all education practitioners to carry out these elements continuously (Rohman & Hairudin, 2018). When all the elements that makeup education are carried out based on a well-planned plan (Saat, 2015), then education will provide great assistance to students in improving their abilities and skills (Triyanto, Anitah, & Suryani, 2013).

Because education is considered as the main cause in the formation of an individual's personality, the implementation of education must be carried out as well as possible so that the objectives of education can be achieved. This is because the purpose of education is the main component in the implementation of learning (Fuad & Alfin, 2017). Basically, education aims to create alumni who have creativity or have the ability to master science and technology (Oetama, 2015), change the behavior of students (O'Reilly, 2018), develop students' abilities so that

they become individuals who have faith and piety, morals noble, democratic, and responsibility (Omeri, 2015).

Education improves human quality through the learning process. Learning is considered a deliberate effort (Pane & Dasopang, 2017). In this effort, the interaction will occur between the individual and his environment (Fatimah & Sari, 2018) to change the pattern of an individual's actions (Hanafy, 2014), i.e. changes to a more advanced or better direction (Hermawan, 2014). According to (Cano & Cardelle-Elawar, 2004) learning is construction in humans that can be developed through their experience and knowledge that can determine the way they think depends on the way they learn. Meanwhile according to (Vermunt & Vermetten, 2004) learning includes what humans understand and how they think, namely learning goals, learning strategies, and learning processes.

One of the subjects that should be studied and understood by learners is mathematical subjects. Mathematics is the concept of the human person about whom he is mathematically (Latterell & Wilson, 2016). Mathematics is used as a tool in doing problem-solving towards the world of Science (Unlu, Ertekin, & Dilmac, 2017), and these subjects can provide facilities to understand the context in real life (Haciomeroglu, 2017). These subjects are subjects that will surely be found by every student ranging from primary school up to university level (Yenni, 2016). Learn about mathematics will involve many skills such as skills solve problems, critical thinking skills, creative thinking skills, skills to work together, communicate skills and others (Brandt, Lunt, & Meilstrup, 2016). Similar to the (Brandt, Lunt, & Meilstrup) (Obara, 2018) also says that involves problem-solving skills is one of the ways in learning mathematics.

In daily life, mathematics plays an important role in solving various problems faced by humans (Heritin, Budiyono, & Slamet, 2016). The purpose of these subjects is to provide students with provisions in living their lives especially the world situation which is always changing dynamically so that every problem which is faced by students can be solved by them (Mubarok, Kusmayadi, & Sujadi, 2016). Through mathematics, students can connect every material or concept they have learned which in turn, it will be used in solving any problems they encounter (Putra, Setiawan, Nurdianti, Retta, & Desi, 2018).

There is a lot of material that students will meet when they learn about mathematics and one of them is fractions. The fractions were a rational number which is the quotient of the number of integers (a/b), where b is not zero (Gabriel, et al., 2013). For example, 1/5, its meaning is of one unified whole which then split 5 with the same great, this should be understood by all students who learn about fractions (Norton, Ulrich, Bell, & Cate, 2018). When learners understand that, they will be able to create a new fractional with an understanding of their own, e.g. 7/5 is the sum of the resulting

fractions 1/5 as much as seven times (Hackenberg, 2007).

Students' understanding of fractions is very important (Mousley & Kelly, 2018). This is because students' knowledge about fractions will lead them to a higher understanding of mathematics (Bailey, Siegler, & Geary, 2014), and it makes them no longer scare mathematics (Siegler, et al., 2012). Besides, if students understand material of fractions, they will find many ways to get a job (Tian & Siegler, 2016). According to (Deringöl, 2019) there are four ways that can be used in expressing fractions, i.e. verbally, symbolically, objectively, and in a model. All those things should be understood by the learners so that they can connect each of these expressions.

Unfortunately, fractional material is material that is considered difficult by students, and many of them make misconceptions of the material (Pattimukay, Juniati, & Budiarto, 2018). The same thing was expressed by (Erdik, 2019) who said that in learning mathematics, the material of the fractions in the numeric chapter is the most difficult material to be understood by students. The fractions in the numeric chapter is the most difficult material to understand. Furthermore, (Erdik, 2019) also found that the material was also considered difficult by educators, even though the fractional material had a contribution in forming the relationship between the representation of mathematical symbols and everyday life. In solving problems about fractions, many students make blunders, and one of them is an error in the process of resolution (Saputro, 2016), which in turn, they will be difficult to answer question related fractions (Saleh & Isa, 2015). These difficulties cause many students whose learning outcomes are below the minimum standards that set by the school (Septiani, Darminto, & Jannah, 2014).

Explanation of the fractions above makes us aware that students need to understand the material of fractions as a provision in living their daily lives and as a provision in facing global challenges. On the other hand, the material is a difficult material for students to be understood by them. It makes the researchers interested to know whether the material of fractions is difficult for students to be understood or not. To get the answers to the question, researchers conducted a case study research in one of the schools in Bandung.

The first objective of this research is to know whether the fractions are difficult to be understood by students or not. Meanwhile, the second goal of this study is to find out which fragments are difficult for students to understand.

RESEARCH DESIGN

The research design used in this study is qualitative. Qualitative research is research that has a relationship with the idea or the views of the subject that are studied (Prabowo & Heriyanto, 2013). The design of this study seeks to construct reality and analyze the meaning of reality (Somantri,

2005). Qualitative research design serves as a guide that connects each of the paradigms of the views of the researchers and the researchers themselves, and the strategies that were used to conduct an investigation and data collection methods (Ngozwana, 2018).

Qualitative research design is begun from a theoretical viewpoint to investigate various problems relating to individuals or groups related to social problems (Creswell, 2007). Design research is focused on phenomena that occur in the human environment (Jackson, 2010). Further, the (Jackson, 2010) said that one of the oldest methods in qualitative research design is a case study that studies human, setting, or social settings to reveal the truth.

RESEARCH METHODOLOGY

The methodology used in the study is the Case Study. According to the (Varanis & Mereles, 2017) that case study research has been extensively conducted in the classroom. Case study research is conducted to explain a particular phenomenon, such as an individual, program, process, and others (Gall, Gall, & Borg, 1999). This method is a method that provides facilities to researchers in conducting explorations to a phenomenon that occurs by using a variety of reliable data sources (Baxter & Jack, 2008).

The case study is a method used to learn about various cases or phenomena that occur in the context of a real-life human being. The case in question is a case relating to individuals, society, politics, economics, politics, school health, beliefs and others (Harrison, Birks, Franklin, & Mills, 2017) whose purpose will depend on the subject studied by the researcher (Harwati, 2019). The case study research attempts to solve a case by using a variety of relevant data (Febrianto & Darmawanti, 2016). The specified data is data that has high quality without taking into account a lot of data (Yona, 2006).

Case study research on mathematics has been widely performed by the researchers, for example, case study about the number (Gibbs, Hinton, & Flores, 2017); (Fuadiah, Suryadi, & Turmudi, 2017), case study on algebra (Samo, 2009); (Hord, et al., 2018), a case study on geometry (Putten, Howie, & Stols, 2010); (Simonsen, et al., 2013), and others. However, from all of these studies, researchers did not find any case study research on fractions. Therefore, researchers were interested to conduct research using the same method, but the subject was different.

DATA COLLECTION TECHNIQUE

The purpose of this study is to find out whether the fractions are difficult for students to be understood by them or not. To find out the case, researchers sought to collect data which in turn, will be analyzed so that researchers can find whether the material was indeed difficult for students or not. The techniques that researchers used to collect data were as follows

1. Observation

One of the tools that are widely used in the study is observation (Briesch, et al., 2018) where it can be done alone (O'Shaughnessy & Patell, 2016). In this study, things that are observed are the way the teacher teaches fractional material to students and learner's behavior in learning.

2. Interview

   One of the data collection tools in classical qualitative research is interview (Dachrud, 2015) which is also a semi-structured data collection tool (Padfield & Procter, 1998). Researchers interviewed the teacher about the method used by the teacher in teaching. Researchers also conducted interviews with some students, that is, students who score above standard criteria and students who score below standard criteria.

3. Test

   The test is done to conduct assessment and measurement of the students' knowledge and mastery about a material that has been taught to them (Nurjanah & Marlianingsih, 2015). In this study, researchers gave students several questions to find the extent of students ' mastery of fractional material. The result of the test will be separated based on the value obtained by students after the test, that is, a score above the standard criteria and a score below the standard criteria.

The data which were obtained were analyzed further by researchers to find the answers about whether the fractions are difficult to be understood by students or not.

RESULT

Researchers gave tests to students in the form of fraction questions to find out the truth that fraction are difficult for students. The results of the test are then analyzed by researchers to find this out. Meanwhile, the results of students' work from the questions given by researchers can be seen in the student test results table

Table 1. Result of Students' Test

No	Score	Standard of Criteria (75)	Total	Percentage (%)
1	0-74	Under	24	85.71
2	75-100	Upper	4	14.29

Form the table of the results of students' test, we can see that the results of students' tests show that there are difficulties of students to complete the questions of the fractions. From the table, we can see that as many as 24 of 28 students with a percentage of 85.71% scored below the standard of criteria. Meanwhile, the students who reach or exceed the standard of criteria are 4 of 28 students with a percentage of 14.29%.

The results obtained by researchers from interviews with educators who teach in the class indicated that students in the class do have less ability against fractions. The teacher of the class revealed that students also have less ability to conduct the operations multiplication so that students are unable to solve problems about multiplication operations and fractions distribution. Furthermore, the teachers of the class also said that many students have difficulty in solving the problem that brought together integers with fractions both multiplication, subtraction, multiplication, or division operations.

Researchers also conducted interviews with several learners who scored below standard criteria about their difficulty in solving fractions problems. All students who interviewed researchers said that they understood the concept of fractions, but they had difficulty in equalizing the denominator to fractional summing operations. They also said that they were not yet proficient in multiplication. Furthermore, they also revealed that they also had difficulties related to mixed fractions in all operations. The things that were expressed by the students are in line with the teacher's statement above.

It can be seen from the results of the students' test. From the 28 students, students who can answer the question correctly fractional multiplication were only 8 students with a percentage of 29%. On questions that bring together fractions with integers, students who answer the question correctly are only 6 of 28 students with a percentage of 21.4%. Meanwhile, the students who answered correctly the question of mixed fractions were 39.3%, i.e. 11 of 28 students, the questions of the fractions with the same denominators can be answered correctly by all students.

When researchers conducted observation, researchers found that many students looked trouble in learning the material. Students looked at the confusion in receiving a material of fractions that was described by the teacher in front of the class. Some students who had difficulty understanding the material only made other activities in the classroom. From here, we can say that it is true that the fractions are difficult to be understood by students.

DISCUSSION

Mathematics is one of the important subjects in life as a foundation for various other sciences (Eismawati, Koeswanti, & Radia, 2019). This subject has been included in the curriculum of Indonesia that will be encountered by every student at every level from primary school to college level (Nugraha & Pujiastuti, 2019). One of the materials in mathematics is fractions. Many experts said that fractions are a difficult material to be understood by students. The material is also the subject of the material in this study, and the results of this study have been described by researchers above.

If we look at the exposure of the results of the research above, we can see that the

material of fractions is the difficult material for students. It is also delivered by (Palpialy & Nurlaelah, 2015) who said that the fractions are considered difficult by students to be understood. This material is also difficult to be taught by the teacher. Similar to it, (Sunariah & Rijal, 2017) also said that fractions are difficult material both teachers and students.

Students also have difficulty in solving questions about mixed fractions. It was also said by (Nuraini, Suhartono, & Yuniawatika, 2016) who said that the change from mixed fractions to ordinary fractions was one of the difficulties for students in learning fractions. In addition, students also find it difficult to answer the question about fractional multiplication and division of fractions. Similar to it, (Sukayati & Marfuah, 2009) expressed that operations of fractions that are very difficult for students to understand are multiplication and division.

The imperfect learning process will make it difficult for students to solve problems related to fractions (Suarjana, Parmiti, & Safitri, 2018). If learners do not understand fractions, it will be a lot of problems that arise in the future (Jordan, et al., 2013). Furthermore, (Jordan, et al., 2013) said that these problems are not only the difficulty of students in understanding algebra but also the difficulty of students in learning higher numbers. Therefore, this material should be well understood by the learners so that they can learn and understand materials at a higher level.

CONCLISION

Based on the explanation of the results and the discussion above, we can draw the conclusion that (1) the students have difficulties in understanding the fractions; (2) the difficulties students about fractions, i.e. difficulty in changing fractions to mixed fractions into uncommon, difficulties in multiplication of fractions, and difficulties in operations that brought together fractions with integers.

SUGGESTION

Based on the explanation of conclusion above, the things that the researchers suggest are as follows: (1) the teacher needs to pay attention to the various difficulties in understanding the fractions; (2) in the learning process, teachers need to take notice of special things related to changing mixed fractions into ordinary fractions, multiplying fractions, and completing operations of fractions that brought together fractions with integers.

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