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Elementary School Students' Mathematical Process Skills in Gender Perspective

Kamid[1*], Noor Fajriah[2], Dwi Agus Kurniawan[3], Rido Ilham Widodo[4]

[1,2,3,4] Faculty of Teaching and Education, Universitas Jambi, Jambi, Indonesia

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ABSTRAK

Tingkat literasi siswa Indonesia menurut PISA sangat jauh tertinggal dari negara lain. Hal ini membuat kemampuan siswa Indonesia dalam mengolah sains jauh tertinggal dari negara lain. Tujuan penelitian ini yaitu menganalisis perbedaan keterampilan proses yang dimiliki peserta didik laki-laki dan perempuan di sekolah dasar negeri dan madrasah ibtidaiyah swasta. Penelitian ini menggunakan jenis metode survei kuantitatif. Penelitian ini dilakukan di dua sekolah dasar negeri (SDN) dan dua sekolah ibtidaiyah (MIS) swasta. Popplusi penelitian ini berjumlah 35 orang per kelas. Instrumen dalam penelitian ini adalah keterampilan proses (PS). Metode yang digunakan dalam mengumpulkan data yaitu survey dan kuesioner. Hasil jawaban angket siswa pada PS dianalisis menggunakan statistik deskriptif dan statistik inferensial. Hasil penelitian yaitu terdapat perbedaan keterampilan proses yang signifikan antara peserta didik laki-laki dan perempuan di madasah ibtidaiyah swasta. Dengan dilakukan penelitian ini, akan berdampak dalam memaparkan tingkat perbedaan keterampilan proses antara peserta didik laki-laki dan perempuan antara sekolah negeri dan swasta.

ABSTRACT

According to PISA, the literacy rate of Indonesian students is very far behind that of other countries. It makes the ability of Indonesian students to process science far behind other countries. This study aims to analyze the differences in the process skills of male and female students in public elementary schools and private madrasah Ibtidaiyah. This study uses a type of quantitative survey method. This research was conducted in two public elementary schools (SDN) and two private Ibtidaiyah schools (MIS). The population of this study amounted to 35 people per class. The instrument in this research is process skills (PS). The methods used in collecting data are surveys and questionnaires. The students' questionnaire answers on PS were analyzed using descriptive and inferential statistics. The results of the study were that there were significant differences in process skills between male and female students in private madrasah ibtidaiyah. This research will have an impact on explaining the level of difference in process skills between male and female students in public and private schools.

1. INTRODUCTION

Education is an effort made to improve the quality and capacity of an individual, and can take place anywhere and anytime (Corsi, 2020; Musanna et al., 2017; Pozo-Armentia et al., 2020). Besides being done to improve one's quality and capacity, education is also carried out to improve one's social skills in a social live (Musanna et al., 2017)(Osberg & Biesta, 2021)(Sarid, 2018). Even so, in reality education improves the quality and capacity of a person in a better direction. This is due to various factors that affect the achievement of educational goals. One way to overcome this problem is to increase student interest in learning. With the increase in student interest in learning, the quality of learning outcomes also increases (Mahendra, 2017; Parrish & Lanvers, 2019; Yu et al., 2020). With the rapid development of the times, education is also required to develop to prepare a better generation.

In this fast-paced era, it takes more than just "education" to improve the quality of a person. The development of special skills is also very much needed, especially in the 21st century (Asrial et al., 2020; Barrot, 2019; Harrop et al., 2018). 21st century skills are one of the general abilities needed in human life in the 21st century, including communication skills, problem solving skills, creativity, critical and structured thinking, the ability to work together, and so on. These skills become one of the learning objectives needed to improve one's quality to face the 21st century (Laksana et al., 2020; Sugito et al., 2017; Wei et al., 2020). One of the skills developments developed in 21st century learning is students' skills to think critically and structured (Carson, 2019; Howard et al., 2018; Siswono, 2017). Critical thinking skills are very important because students are required to know the cause and effect of an event. So that students understand a

*Corresponding author.
E-mail addresses: pak_bakri@unja.ac.id (Kamid)

problem not only its solution, but also the causes and influences of the problem. Critical thinking skills are one of the most important 21st century skills where these skills are used to solve problems logically and rationally by involving scientific process abilities (Hamdu et al., 2020; Solé-Llussà et al., 2019; Wahyuni et al., 2017). Science process skills are basic skills to find answers by asking questions and conducting various experiments. By applying science process skills, students can connect everyday problems with the knowledge they get at school, so that learning becomes more meaningful for students. With science process skills, students can find concepts and solve problems that they find themselves. This makes students more responsible for the solutions they find (Concannon et al., 2020; Darmaji, Kurniawan, et al., 2019; Iswatun et al., 2017). Improving students' science process skills can be done by increasing students' literacy levels.

Identifying a problem, and explaining it scientifically with concrete evidence is the meaning of scientific literacy. With good literacy skills, students can find answers to a problem, then convey the solutions to the problems they find both orally and in writing (Perdana et al., 2019; Vaughn et al., 2020). Unfortunately, the literacy level of Indonesian students according to PISA (Program for International Student Assessment) is very far behind other countries, this makes the ability of Indonesian students to process science far behind other countries (Akbar, 2018; Ives et al., 2020; Li et al., 2021). There are various ways to increase student literacy levels, including by giving attention and feedback to students or by forming student literacy groups. This will make students have their own desire to improve literacy, either because it is influenced by the attention of the teacher or environmental influences who are also accustomed to literacy (Carless & Winstone, 2020; Vaughn & Fisher, 2020; Warrican et al., 2019). In the end, literacy is a cognitive ability that is influenced by the affective domain. Which is the attitude, motivation, and interest from within the students themselves that determine the low and high level of student literacy.

The attitude of students in learning is very important. Because, students who have a positive attitude will make students more interested in learning the lesson (Jufrida et al., 2019; Kapici et al., 2020). Students' interest in a lesson can affect the level of success in the learning. However, with various age levels, student interests can vary from one student to another. So that interest guidance is needed as motivation for students in facing a lesson (Abbott, 2017; Bolkan & Griffin, 2018; Z. Luo et al., 2020). In learning science, there are many things that affect students' interest in these subjects, including teachers, environment, background, gender, students' self-motivation (J. P. Cain, 2020; J. M. Luo et al., 2019). The interests and interests of students differ from one another. Therefore the guidance of students' interests is very much needed for the success of the learning process.

Mathematics is one of the subjects that must be learned since elementary school. This proves how important mathematics is in life, but mathematics is also one of the most difficult subjects to understand (Arifin & Herman, 2018; Kenedi et al., 2019; Surya et al., 2017). One of the most difficult materials in mathematics is fractions (Akman & Çakır, 2020; Saleh et al., 2018). Contains comparisons of numbers, and it is difficult to describe the problems in real life, making fractions the most difficult material in mathematics. However, there are always ways to solve problems related to the difficulty of learning fractions. One solution is to understand the concepts and basic understanding of students regarding the material being taught (Alan & Afriansyah, 2017; Andrews et al., 2019; Nasution et al., 2018). Of course, students' interests and interests also greatly affect the success of the learning process for fractions, but the student learning environment also affects the student's learning process, one of which is gender. Men have dominated science if we look at the history of science. There are many male characters who influence science. But at this time, women began to influence the world of science. With the existence of 'gender equality' women began to have an influence in the world of science. Basically, the definition of gender is the role or view that is directed at men or women. This view is shaped by social and cultural structures. However, in an era like today, it is possible that women can also be influential in the world of science. However, the result of classical stereotypes in society causes gender inequality

Research related to science process (PS) and interest has been done before, but among these studies there are still some shortcomings. For example, using only two class samples in one school, there is no explanation regarding the effect of gender on students' PS levels (Darmaji, Astalini, et al., 2019; Elvanisi et al., 2018; Hernawati et al., 2018). Whereas previous research related to interest only connected students' interest in learning with learning motivation (Jabari P. Cain, 2020; J. M. Luo et al., 2019; Sarid, 2018). Other research did not compare the process skills between genders (Mutlu, 2020). Meanwhile, other research evaluates the process skills possessed by students. What distinguishes this research from previous research on process skills is that in this research, process skills focuses on analyzing the differences in process skills possessed by male and female students (Yiğit Özüdoğru & Demiralp, 2021). This is very important to do, in order to obtain information related to the advantages and disadvantages of both male and female students. This study also aims to analyze the differences in the process skills of students in public elementary schools and students in private madrasah ibtidaiyah. Thus, the results of this study can be used as an evaluation of

learning in the classroom. Which later, can be used as a basis for creating appropriate learning, in order to achieve learning objectives.

2. METHOD

This study uses a type of quantitative survey method. Qualitative research is a field of inquiry that stands alone, is scientific in nature and aims to understand social reality (Rukin, 2019). The data obtained is the data of process skills (PS). The data has been obtained with a Likers scale 4. This research gains an understanding of a phenomenon from basic logic, usually includes the perspective of the research population. In essence, qualitative research observes people in the environment as well as in the social sciences. The procedure for the quantitative survey method used in the study is presented in Figure 1.

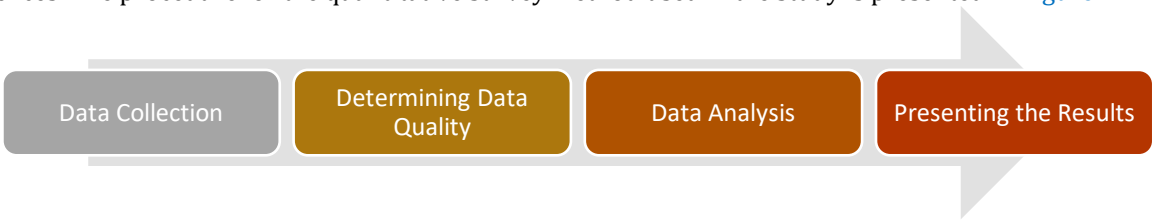

Figure 1. The Procedure for the Quantitative Survey Method (Huber & Froehlich, 2020)

This research was conducted in two public elementary schools (SDN) and two private ibtidaiyah schools (MIS) with the research population consisting of sixth grade students. From this population, two classes were taken in each school with up to 35 students in each class. The instruments in this research are process skills (PS). The assessment instrument is one of the most important assessment instruments for cognitive. The Likers scale used in the student PS research is: 1 (very bad), 2 (not good), 3 (good), 4 (very good), with 47 questions for the student PS questionnaire. This research was carried out as many as 8 samples, namely classes 6A and 6B at SD 1 Pasar Muaro Tembesi, class 6A and 6B at SD 52 Kilangan II, classes 6A and 6B at MIS Nurul Ihsan, classes 6A and 6B at MIS Simpang Sungai Rengas with each each class has 35 students. The sample consists of two groups, namely the experimental group and the control group (Astuti et al., 2018; Fromowitz, 2017). So that the total number of respondents is 70 students. At the time of testing, the male population and female population will be taken. The population is the person who is the subject of research or the characteristics to be studied (Banks et al., 2018). Furthermore, the PS students' questionnaire on the addition and subtraction of fractions can be seen in the Table 1.

Tabel 1. Student PS Instruments Grid on Addition and Subtraction of Fractions

Variable	Indicator	Question Number
Process Skills of Student on the Material Multiplecat of Fraction	Observation	1,2,3
	Communication	4,5,6,7
	Classification	8,9,10,11,12
	Maesuration	13,14,15
	Conclusion	16,17,18,19
	Prediction	20,21,22,23,24
	Table compiling	25,26,27
	Acquire and process data	28,29,30,31
	Experiment analysis	32,33,34,35
	Ctreating hypothesis	36,37,38
	Designing an experiment	39,40,41,42,43
	Do an experiment	44,45,46,47
Total of question		**48**

For student PS research on the material of adding and subtracting fractions, this was carried out using four school samples, namely SD 1 Pasar Muaro Tembesi, SD 52 Kaliangan II, MIS Nurul Ihsan, and MIS Simpang Sungai Rengas, each school consisting of grades VI A and class VIB. The sampling technique used in this study used simple random sampling. The sampling technique was adopted because it provides unbiased parameter estimates and is better if the population is homogeneous (Alhassan & & Chen, 2019; Bankole & Nasir, 2020). Using random sampling can reduce the potential for bias in the selection of cases to be included in the sample. With the condition that random sampling is done because of the homogeneous population, the sampling frame is clear and general in nature.

The results of the student's questionnaire answers on PS were analyzed using descriptive statistics and inferential statistics. Descriptive statistics are often referred to as frequency distributions which provide an accurate measure of data ranging from the smallest to the largest. While inferential statistical analysis aims to estimate parameters and test the hypothesis of a study, so that it can be easier to draw conclusions (Al Mutairi, 2018). Descriptive statistics used in its presentation use estimated values and experimental values, from the two parameters such as mean, arithmetic, and standard deviation. The nomarality test aims to determine whether a data can be said to be normal or not, while the homogeneous test aims to determine whether the data of the two samples is homogeneous or not. The first step in this research is to determine the normality and homogeneity of a data using normality test and homogeneity test. Normality test and homogeneous test if the result data in the population is normally distributed and homogeneous, then the condition is that the sig value is greater than 0.05.

3. RESULT AND DISCUSSION

Result

The data were obtained from four different schools, namely SD 1 Pasar Muaro Tembesi, SD 52 Kaliangan II, MIS Nurul Ihsan, and MIS Simpang Sungai Rengas. This data was then analyzed using descriptive statistics using the SPSS application by school. The results of the descriptive statistical analysis of student PS with observation, measuring, compiling a table, communication indicators. The description of the PS students reviewed through four indicators including indicators of observation, measurement, compiling tables, and communicating. From the results of the research conducted, it was found that on the observation indicators female students had a better average score than male students. While the indicators measure, both male and female students do not have a very significant difference in the level of ability. However, in the indicator of compiling a table male students at SDN 1 Pasar Muaro Tembesi have a better skill level than female students in the same school. Finally, on the indicators of communicating, female and male students do not have a very significant difference in the level of ability, except in MIS Nurul Ihsan where female students have a better skill level than male students with communicating indicators. Furthermore, the normality test for students' PS on learning with the addition and subtraction of fractions can be seen in the Table 2.

Tabel 2. Student PS Normality Test Table.

	Test of Normality		
Variable	**Schools**	**Sig.**	**Distribute**
V_1	SDN 1 Pasar Muaro Tembesi	0.210	Normal
	SDN 52 Kaliangan II	0.403	Normal
	MIS Nurul Ihsan	0.824	Normal
	MIS Simpang Sungai Rengas	0.717	Normal
V_2	SDN 1 Pasar Muaro Tembesi	0.541	Normal
	SDN 52 Kaliangan II	0.671	Normal
	MIS Nurul Ihsan	0.349	Normal
	MIS Simpang Sungai Rengas	0.271	Normal
V_3	SDN 1 Pasar Muaro Tembesi	0.482	Normal
	SDN 52 Kaliangan II	0.231	Normal
	MIS Nurul Ihsan	0.197	Normal
	MIS Simpang Sungai Rengas	0.485	Normal
V_4	SDN 1 Pasar Muaro Tembesi	0.215	Normal
	SDN 52 Kaliangan II	0.561	Normal
	MIS Nurul Ihsan	0.319	Normal
	MIS Simpang Sungai Rengas	0.249	Normal

In the student's PS normality test, it was shown that the four school samples had data that were normally distributed with a sig value greater than 0.05. Furthermore, the homogeneous PS students' test of learning with the addition and subtraction of fractions. Based on data analysis, it can be seen that the results of the data homogeneity test have a sig value that is greater than the sig 0.05. So that the data used in this study is homogeneous. Furthermore, data hypothesis testing in the form of T test is displayed in this study and can be seen in the Table 3.

Tabel 3. Table of Students PS T-Test

School	Gender	N	Mean	Sig.	Sig (2-tailed)
SDN 1 Pasar Muaro	Female	38	124.9211	0.145	0.754
Tembesi	Male	32	124.3125	0.145	0.754
SDN 52 Kaliangan II	Female	38	125.5526	0.398	0.992
	Male	32	125.5313	0.398	0.992
MIS Nurul Ihsan	Female	38	125.8947	0.597	0.043
	Male	32	123.5625	0.597	0.043
MIS Pasar Muaro	Female	38	121.6316	0.313	0.049
Tembesi	Male	32	123.7188	0.313	0.049

From the data above, it can be seen that there is a difference in the level of PS between male and female students in madrasah schools as evidenced by the value of sig (2-tailed) less than 0.05. While in public schools there is no very significant difference between male and female students, as evidenced by the value of sig (2-tailed) greater than 0.05.

Dicussion

Mathematics is a compulsory subject even from elementary school (Nurlaily et al., 2019; Santagata & Yeh, 2014; Utami & Wutsqa, 2017). Generally, mathematics is less attractive to students because the material is difficult (Agustian et al., 2015; Sanusi et al., 2015; Wulandari et al., 2020). One example of the material is fractions. Fractions are one of the most difficult mathematics materials for students, especially elementary school students (Ardina et al., 2019; Hidayati, 2012). In this study, data collection related to students' processing abilities related to the addition and subtraction of counting materials was carried out. The comparison between male and female students in the four schools that became the research sample is very clearly seen in the indicators of communicating. Where, female students at MIS Nurul Ihsan have a much different level of ability compared to male students at the school. However, male students at SDN 1 Pasar Muaro Tembesi have a higher level of ability to compose tables than female students. Meanwhile, in the observation indicators and measuring indicators, there is no significant difference between male and female students. However, in the observation indicators, female students at SDN 52 Kaliangan have the lowest level of ability while other students have a level of ability that is not much different. The same can be seen in measuring indicators. Where male and female students at MIS Simpang Sungai Rengas have a higher level of ability than the others. Thus, gender differences are not the only important factor that affects the level of student PS in each school.

There have been many studies related to PS in mathematics learning, one of which is research (Alan & Afriansyah, 2017). In his research, he conducted an experiment to improve students' PS in solving mathematical problems. The drawback of this research is that Alan only uses two class samples at the same school. So the results and conclusions obtained are not universal. While other studies only use two class samples in one school (Astalini et al., 2019; Elvanisi et al., 2018). There are other studies that test the effect of the model on students' PS levels without explaining variables or indicators that can affect students' PS levels (Alan & Afriansyah, 2017; Iswatun et al., 2017; Wahyuni et al., 2017). Other research did not compare the process skills between genders (Mutlu, 2020). Meanwhile, other research evaluates the process skills possessed by students (Yiğit Özüdoğru & Demiralp, 2021). However, in this study, a comparison of students' PS levels regarding the material of addition and subtraction of fractions was carried out by comparing male students and female students in each school, with indicators of observing, measuring, compiling tables, communicating. So that it can be seen how the level of PS compares for each gender.

In the study, it was found that madrasah students used samples of SD 1 Pasar Muaro Tembesi, SD 52 Kaliangan II, MIS Nurul Ihsan, and MIS Simpang Sungai Rengas. Students at MIS Simpang Sungai Rengas had a higher PS level than the sample of students in other schools. This makes the PS level of madrasah students higher than that of state school students at the elementary school level in terms of adding and subtracting fractions. However, students at SDN 1 Pasar Muaro Tembesi also do not have a PS score that is too low in dealing with the addition and subtraction of fractions which is one of the weaknesses of this study. The weakness of this study is that the study only uses one variable to compare the level of PS between public elementary school students (SDN) and private madrasah ibtidaiyah (MIS) students. Meanwhile, we cannot only compare with only one variable, because there are many things that affect students' PS level. Such as, interests, motivation, self-confidence, environment and so on, which can be used as material for further research.

4. CONCLUSION

There are differences in the process skills of male and female students in grade 6 Public Elementary School and Private Madrasah Ibtidaiyah. It is evidenced in this study, which can be seen that there is no significant difference in process skills between male and female students in grade 6 SD. Meanwhile, in private madrasah ibtidaiyah, there are significant differences in science process skills between male and female students. Factors that cause such interests, attitudes, learning models and so on are the limitations of this study.

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