Process Skills in Mathematics Learning

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A R T I C L E   I N F O

A B S T R A K

Keterampilan proses yang dimiliki siswa saat ini masih tergolong rendah. Masalah ini merupakan masalah yang harus diselidiki untuk mengetahui bagaimana keterampilan proses yang dimiliki siswa. Penelitian ini mengukur keterampilan proses siswa di empat sekolah. Tujuan dari penelitian ini adalah untuk mendeskripsikan keterampilan proses siswa di masing-masing sekolah dan untuk mengetahui perbedaan keterampilan proses siswa di masing-masing sekolah. Penelitian ini menggunakan penelitian kuantitatif dengan prosedur penelitian survey. Jumlah sampel sebanyak 140 sampel. Instrumen yang digunakan dalam penelitian ini adalah lembar observasi keterampilan proses yang telah divalidasi oleh validator ahli. Penelitian ini menggunakan teknik analisis data berupa uji analisis statistik deskriptif dan uji analisis statistik inferensial. Hasil penelitian yaitu keterampilan proses siswa dapat dikategorikan baik hingga sangat baik. baik pada keempat indikator tersebut. Melalui penelitian juga diketahui bahwa terdapat perbedaan yang signifikan antara keterampilan proses dserta terdapat perbedaan yang signifikan antara keterampilan. Dampak positif yang dapat dirasakan guru adalah mengetahui bagaimana keterampilan proses yang dimiliki siswa di sekolahnya.

A B S T R A C T

The process skills possessed by students are currently still relatively low. This problem must be found to find out how the process skills possessed by students are. This study measures the skills of students in four schools. The purpose of this study was to describe students' process skills in each school and to determine the differences in the students' process skills in each school. This study uses quantitative research with survey research procedures. The number of samples is 140 samples. The instrument used in this research is a process skill observation sheet that an expert validator has validated. This study uses data analysis techniques in the form of descriptive statistical analysis tests and inferential statistical analysis tests. The research results on student skills can be categorized as good to very good. Good on all four indicators. Through research, it is also known that there are significant differences between process skills and there are significant differences between skills. The positive impact that teachers can feel is knowing how the process skills possessed by students in their schools are.

1. INTRODUCTION

The 21st century is an era where technology is increasingly being used in various activities in human life. This century requires humans with the ability to think critically (Dewi et al., 2017; Kardoyo et al., 2020; Pahrudin et al., 2019; Pramestika et al., 2020). The focus of the world of education in this century is technology and information which is growing rapidly (Cavanagh et al., 2020; Mutakinati et al., 2018; Setiawan et al., 2017; Wardani et al., 2017). The development of technology is what creates the latest innovations in the world of education (Bakri et al., 2019; Lestari et al., 2021; Simanjuntak & Budi, 2018). Through these new innovations, changes and developments in the world of education in Indonesia are formed. Every Indonesian citizen is obliged to obtain education. Education is a continuous process that aims to shape the character of students (Afandi et al., 2019; Andriana et al., 2017; Hartini, S. et al., 2018). Education in Indonesia focuses on attitudes, intelligence, and student achievement (Kosim, 2020; Rahmawati, 2018; Syam, 2019). The character of students becomes the most important main focus in education (Buldur & Omeroglu, 2018; Darmaji et al., 2019; Suastra et al., 2017). The formation of positive character proves the achievement of educational goals. Process skills are very important. Process skills are the basis for doing thinking which provides opportunities for students to experiment directly (Annisa et al., 2021; Desnita & Susanti, 2017; Esi Febrina & Mukhidin, 2019; Fujiyanti et al., 2018; Hayati et al., 2019). Learning outcomes are not only assessed from the mastery of concepts but can be seen from the skills of the learning process which aims to develop a sense of responsibility (Bakri et al., 2019; Elvanisi et al., 2018; Puspita, 2019). Learning must emphasize process skills because process skills are needed in learning (Darmaji et al., 2020; Marnita, 2013; Redhana, 2019; Wahyudi & Lestari, 2019). The higher the

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process skills in students, the easier it is for students to learn. Mathematics is one of the subjects that is always taught in education in Indonesia. Mathematics is a universal science that supports technological development (Awalia et al., 2019; Nur & Palabo, 2018; Rasyid, 2017). Mathematics subjects need to be given to all students (Firdaus et al., 2019; Muslimin. et al., 2017; Noto et al., 2018). Mathematics subjects shape the attitudes and creative thinking patterns of students (Mustakim, 2020; Purwasi & Fitriyana, 2019; Virgiawan et al., 2018). Mathematics is a subject that has a lot of impact on the lives of every student. Building space is part of the mathematics subject which is included in the geometry section which studies the volume of cubes, blocks, prisms, and pyramids (Astutik, 2017; Khaerunnisa & Pamungkas, 2018; Rhilmanidar et al., 2020). This process skills research has been researched by Asih. The research conducted by Asih used two classes, namely the first class as the control class and the second class as the experimental class. This research conducted by Asih only uses two classes in one school, this is what Asih's research lacks. In this study, it was found that the success of improving process skills was due to the impact of the use of learning facilities. In line with Asih's research, research on process skills was also conducted by Mahdian.

The result of Mahdian's research is that there are differences in students' process skills in the experimental class and the control class. This study only used two classes, namely the experimental class and the control class (Elvanisi et al., 2018; Oktafiani et al., 2017; Prihatini, 2017). The findings of previous studies stated that students lacked process skills when participating in mathematics learning activities (Knatauskaitė et al., 2021; Smedt et al., 2013). The findings of previous studies also state that information processing skills are colored by the principles of Active Student Learning (Bakri et al., 2019; Elvanisi et al., 2018; Puspita, 2019; Sigmundsson et al., 2010). Process skills should appear in science and technology group subjects, including mathematics. In the process skills approach, teachers must manage teaching and learning activities that focus on actively and creatively involving students in obtaining learning outcomes (Darmaji et al., 2020; Marnita, 2013; Redhana, 2019; Wahyudi & Lestari, 2019). Even in learning mathematics, this process skills approach is very suitable. This research needs to be done because of the importance of process skills in learning mathematics. In addition, the low process skills possessed by students in learning mathematics must be overcome to be able to improve the quality of students' self. Therefore, this research needs to be done in order to assist teachers in finding the best solution to improve students' skills in learning mathematics. Based on the description above, the researcher is interested in conducting research to analyze students' skills at SDN 156/I Bulian Baru, SDN 001/I Pasar Muara Tembesi, MIS Nurul Ihsan, and SIM Simpang Sungai Renga. The difference between students' process skills at SDN 156/I Bulian Baru and process skills at SDN 001/I Pasar Muara Tembesi. Differences in student process skills at MIS Nurul Ihsan and student process skills at MIS Simpang Sungai Rengas. Through the findings or results of this research, it is hoped that it can help contribute/assist teachers in designing learning to improve students' process skills.

2. METHODS

Research is a series of planned and systematic activities to solve various problems. This research uses quantitative research with survey research procedures. Quantitative research method is a method that tests various theories by examining the relationship between variables (Harta et al., 2020). This survey research procedure is research that collects information about the characteristics of the actions or opinions of a group of representatives who are considered as the population. The population in this study were SDN 156/I Bulian Baru, SDN 001/I Pasar Muara Tembesi, MIS Nurul Ihsan, and MIS Simpang Sungai Rengas. The sampling technique is total sampling. The number of samples is 140 samples. A total of 70 samples came from public elementary schools, 35 samples from each school were taken from SDN 156/I Bulian Baru and SDN 001/I Pasar Muara Tembesi. as many as 35 samples from MIS Nurul Ihsan and MIS Simpang Sungai Rengas. The instrument used in this study is a process skill observation sheet that has been validated by an expert validator. The instrument in this study used a questionnaire with 15 statement items. This instrument uses data in the form of numbers with 4 Likert scales. This study provides an understanding of a phenomenon in the form of basic logic that includes a population perspective. The grids used in the process skills observation instrument on cube and block material can be seen in Table 1.

Table 1. Grid of Process Skills Observation Instruments on Blocks and Cubes

Indicator	Statement Item Number
Classification	8, 9, 10, 11, 12
Obtaining and Processing Data	28, 29, 30, 31

Measure	13, 14, 15
Arange Table	25, 26, 27

This study uses data analysis techniques in the form of descriptive statistical analysis tests and inferential statistical analysis tests. Descriptive statistics and inferential statistics provide an accurate measure of data. The data analysis technique in this study uses program assistance in the SPSS application. The presentation of data for this descriptive statistical analysis test is in the form of mean, mode, median, maximum and minimum. Meanwhile, the presentation of data for inferential statistical analysis is in the form of assumption test data and hypothesis testing. The assumption test consists of normality test, homogeneity test, and linearity test, while the hypothesis test is in the form of T test. The requirements for normality test and homogeneity test are significant values greater than 0.05 (Awaludin et al., 2020; Dehadri & Dehdari, 2020). The research procedure was carried out in stages. The stages begin with preparation and then proceed with making proposals, making research objectives and determining the variables to be used. Furthermore, a literature review is carried out, looking for supporting theories and deepening the discussion of the problem under study. At the data collection stage, the observation sheet is distributed to all schools that will be used as research subjects and then the data is filtered to get proper data. The appropriate data were then analyzed using an application program on SPSS. The research procedure can be seen in Figure 1.

Figure 1. Research Procedure

3. RESULT AND DISCUSSION

Results

The results of this study came from four different schools, namely SD Negeri 156/I Bulian Baru, SD Negeri 001/I Pasar Muara Tembesi, MI Private Nurul Ihsan, and MI Private Simpang Sungai Rengas. The data were then analyzed using an application program on SPSS. The analytical test used is descriptive statistical analysis test, assumption analysis test, and hypothesis analysis test.

Table 2. Descriptive Statistical Test of Process Skills on Classification

School	Interval	Category	Mean	Median	Min	Max	%
SDN 156/I Bulian Baru	5,00 – 8,75	Very Not Good	14,86	14,00	5,00	16,00	11,4
	8,76 – 12,50	Not Good					7,1
	12,51 – 16,25	Good					32,9
	16,26 – 20,00	Very Good					48,6
	Total						100
SDN 001/I Pasar Muara Tembesi	5,00 – 8,75	Very Not Good	14,88	14,00	5,00	16,00	11,4
	8,76 – 12,50	Not Good					7,1
	12,51 – 16,25	Good					48,6
	16,26 – 20,00	Very Good					32,9
	Total						100
MIS Nurul Ihasan	5,00 – 8,75	Very Not Good	14,58	14,00	5,00	16,00	10,0
	8,76 – 12,50	Not Good					32,9
	12,51 – 16,25	Good					45,7
	16,26 – 20,00	Very Good					11,4
	Total						100
MIS Simpang Sungai Rengas	5,00 – 8,75	Very Not Good	14,61	14,00	5,00	16,00	7,1
	8,76 – 12,50	Not Good					15,7
	12,51 – 16,25	Good					31,4
	16,26 – 20,00	Very Good					45,7
	Total						

Results Based on the statistical analysis of the descriptive values in Table 2, it can be seen that the average student process skills were the highest on the classification indicators from SDN 001/I Muara Tembesi Market with an average value of 14.88. The results of the analysis show that students at SDN and MIS Batanghari have process skills, especially classification in the medium to very good category.

Table 3. Descriptive Statistical Test of Process Skills on Data Obtaining and Processing Indicators

School	Interval	Category	Mean	Median	Min	Max	%
SDN 156/I Bulian Baru	4,0 – 7,0	Very Not Good	10,80	12,00	4,00	16,00	13,9
	7,1 – 10,0	Not Good					16,7
	10,1 – 13,0	Good					38,9
	13,1 – 16,0	Very Good					30,6
	Total						100
SDN 001/I Pasar Muara Tembesi	4,0 – 7,0	Very Not Good	11,52	11,00	4,00	16,00	22,2
	7,1 – 10,0	Not Good					22,2
	10,1 – 13,0	Good					36,1
	13,1 – 16,0	Very Good					19,4
	Total						100
MIS Nurul Ihasan	4,0 – 7,0	Very Not Good	11,36	10,00	4,00	16,00	27,8
	7,1 – 10,0	Not Good					22,2
	10,1 – 13,0	Good					36,1
	13,1 – 16,0	Very Good					13,9
	Total						100
MIS Simpang Sungai Rengas	4,0 – 7,0	Very Not Good	11,70	12,00	4,00	16,00	7,1
	7,1 – 10,0	Not Good					15,7
	10,1 – 13,0	Good					31,4
	13,1 – 16,0	Very Good					45,7
	Total						

Based on the results of the descriptive statistical test analysis in Table 3, it can be seen that the highest average value of student process skills on the indicators of obtaining and processing data comes from MIS Simpang Sungai Rengas with an average value of 11.70. The results of the analysis show that students at SDN and MIS Batanghari have process skills, especially in obtaining and processing data in the moderate to very good categories.

Table 4. Descriptive Statistical Test of Process Skills on Measuring Indicators

School	Interval	Category	Mean	Median	Min	Max	%
SDN 156/I Bulian Baru	3,0 – 5,25	Very Not Good	7,80	9,00	3,00	12,00	13,9
	5,26 – 7,5	Not Good					16,7
	7,6 – 9,75	Good					38,9
	9,76 – 12,0	Very Good					30,6
	Total						100
SDN 001/I Pasar Muara Tembesi	3,0 – 5,25	Very Not Good	7,98	9,00	3,00	12,00	11,1
	5,26 – 7,5	Not Good					19,4
	7,6 – 9,75	Good					22,2
	9,76 – 12,0	Very Good					47,2
	Total						100
MIS Nurul Ihasan	3,0 – 5,25	Very Not Good	7,31	9,00	3,00	12,00	27,8
	5,26 – 7,5	Not Good					22,2
	7,6 – 9,75	Good					36,1
	9,76 – 12,0	Very Good					13,9
	Total						100
MIS Simpang Sungai Rengas	3,0 – 5,25	Very Not Good	7,28	9,00	3,00	12,00	7,1
	5,26 – 7,5	Not Good					15,7
	7,6 – 9,75	Good					31,4
	9,76 – 12,0	Very Good					45,7
	Total						100

Based on the results of the descriptive statistical test analysis in Table 4, it can be seen that the highest average value of students' process skills on the indicators of obtaining and processing data comes from SDN 001/I Muara Tembesi with an average value of 7.98. The results of the analysis show that students at SDN and MIS Batanghari have process skills, especially in obtaining and processing data in the moderate to very good categories.

Table 5. Descriptive Statistical Test of Process Skills on Indicators Compiling Tables

School	Interval	Category	Mean	Median	Min	Max	%
SDN 156/I Bulian Baru	3,0 – 5,25	Very Not Good	8,72	8,00	3,00	12,00	11,1
	5,26 – 7,5	Not Good					30,6
	7,6 – 9,75	Good					33,3
	9,76 – 12,0	Very Good					25,0
	Total						100
SDN 001/I Pasar Muara Tembesi	3,0 – 5,25	Very Not Good	8,75	8,00	3,00	12,00	8,3
	5,26 – 7,5	Not Good					33,3
	7,6 – 9,75	Good					33,3
	9,76 – 12,0	Very Good					25,0
	Total						100
MIS Nurul Ihasan	3,0 – 5,25	Very Not Good	8,88	8,00	3,00	12,00	11,1
	5,26 – 7,5	Not Good					33,3
	7,6 – 9,75	Good					41,7
	9,76 – 12,0	Very Good					13,9
	Total						100
MIS Simpang Sungai Rengas	3,0 – 5,25	Very Not Good	8,66	8,00	3,00	12,00	11,1
	5,26 – 7,5	Not Good					33,3
	7,6 – 9,75	Good					33,3
	9,76 – 12,0	Very Good					22,2
	Total						100

Based on the results of the descriptive statistical test analysis in Table 5, it can be seen that the highest average value of student process skills on the indicators of compiling tables comes from MI Nurul Ihsan with an average value of 8.88. The results of the analysis show that students at SDN and MIS Batanghari have process skills, especially in compiling tables in the category of moderate to very good.

Table 6. Normality

School Name	N	Statistics	Sig.
SDN 156/I Bulian Baru	35	0,965	0,647
SDN 001/I Pasar Muara Tembesi	35	0,933	0,833
MIS Nurul Ihasan	35	0,935	0,533
MIS Simpang Sungai Rengas	35	0,971	0,774

Based on the Table 6, it can be seen that the significant value> 0.05 means that the process skills data is normally distributed.

Table 7. Homogeneity Test

School Name	N	F	Sig.
SDN 156/I Bulian Baru	35	0,058	0,817
SDN 001/I Pasar Muara Tembesi	35		
MIS Nurul Ihasan	35	0,156	0,695
MIS Simpang Sungai Rengas	35		

Based on the Table 7, it can be seen that the significant value> 0.05 means the process skills data is homogeneous.

Table 8. T Test of Process Skills at SDN 156/I Bulian Baru and SDN 001/I Pasar Muara Tembesi

Class	N	Mean	Sig.	Sig. (2-tailed)
SDN 156/I Bulian Baru	70	122,71	0,828	0,010
SDN 001/I Pasar Muara Tembesi		125,20		

Based on the Table 8, it can be seen that there is a significant difference between process skills at SDN 156/I Bulian Baru and process skills at SDN 001/I Pasar Muara Tembesi seen from the significance value, namely the value of sig. (2-tailed) < 0.05.

Table 9. T Test of MIS Process Skills Nurul Ihasan and MIS Simpang Rengas River

Class	N	Mean	Sig.	Sig. (2-tailed)
MIS Nurul Ihasan	70	124,17	0,756	0,005
MIS Simpang Sungai Rengas		121,37		

Based on the Table 9, it can be seen that there is a significant difference between process skills at MIS Nurul Ihasan and process skills at MIS Simpang Sungai Rengas seen from the significance value, namely the value of sig. (2-tailed) < 0.05.

Discussion

This study was conducted to determine the process skills of students at the elementary school and madrasah ibtidaiah levels by using four indicators, namely classification indicators, indicators of obtaining and processing data, measurement indicators, and indicators of compiling tables. Based on the results of statistical test analysis, it can be seen that the four schools tested had positive test results, meaning that each school tested had a good to very good category on each indicator. In line with this research, research on process skills was also conducted by (Bedar & Al-Shboul, 2020; Dewi et al., 2017; Solé-Llussà et al., 2019). Through his research, it is known that there is an increase in student learning outcomes in learning after applying the process skills approach (Kardoyo et al., 2020; Yildiz & Yildiz, 2021). Through his research, it is also known that the process skills possessed by students are in the good category. Based on the T test analysis of process skills at SDN 156/I Bulian Baru and SDN 001/I Pasar Muara Tembesi, it can be seen that there is a significant difference between process skills at SDN 156/I Bulian Baru and process skills at SDN 001/I Pasar Muara Tembesi. Based on the t-test analysis of process skills at MIS Nurul Ihsan with MIS at Sungai Rengas intersection, it can be seen that there is a significant difference between process skills at MIS Nurul Ihsan and process skills at MIS at Sungai Rengas Intersection. Based on the results of his research, it was found that the process skills possessed by the experimental class were much higher than the process skills possessed by the control class (Gultepe & Kilic, 2015; Oktafiani et al., 2017). However, this study has limitations by using only two classes in one school. Another study found that before the application of process skills, students' problem solving abilities were in the less category with a percentage of 46.71% (Lestari et al., 2018). After the application of process skills, the problem-solving ability of students is in the very good category with a percentage of 80.08%. Another study explain and detail the steps of implementing the problem based learning model and to find out the improvement of process skills and student learning outcomes of mathematic (Kamza et al., 2021). The three studies that have been described do discuss students' process skills, but these studies are different from this study. This is because this research focuses on the process skills possessed by students in learning mathematics.

However, the studies mentioned above focus on how to improve the process skills of students by using various learning methods and models. Not only that, the study also only used two classes in one school so that the data obtained were still small in scope, so a study was conducted using data from four different schools in the same area. Process skills are very important to research because they have a big role in learning. Therefore, before conducting research on how to improve students' process skills, it is necessary to conduct research that discusses the description of the process skills possessed by students in learning mathematics. Although research that discusses process skills has been widely carried out by other studies, it is very rare to find research that focuses only on students' process skills. In addition, research on process skills is also often carried out at the junior high school and senior high school levels. This study measures process skills at the junior and senior high school levels (Astra & Wahidah, 2017; Maiyena & Haris, 2017). It is very rare to find research that discusses process skills at the elementary school level. Therefore, this research also needs to be done to obtain the latest findings that discuss the

description of students' process skills at the elementary school level. The positive impact that can be felt by teachers is knowing how the process skills possessed by students in their schools are (Aktamis & Yenice, 2010; Cakir & Sarikaya, 2010; Mutlu, 2020). Teachers can use this research as an evaluation material and motivation to improve the process skills of their students. Positive things can also be felt by students, namely through this research it can measure how process skills are experienced at this time. Students can use the results of this research as an evaluation material for themselves. However, this research is still limited. This is because this study only provides analysis results for four schools in the Batanghari area.

4. CONCLUSION

Based on the results of the research that has been done, several conclusions can be drawn, namely process skills can be categorized as good to very good on the four indicators used. In addition, based on the research, it is also known that there are significant differences between students' process skills in each elementary school. Furthermore, this research has a positive impact on teachers and students.

5. ACKNOWLEDGEMENT

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