



Collaborative Character, Cognitive Psychology, and Process Skills: The Impact of Character-Based Mathematics Learning in High Grades of Elementary Schools

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ABSTRAK

Pembelajaran matematika adalah mempersiapkan siswa untuk mampu menggunakan pola pikir matematis dalam kehidupan sehari-hari. Pembelajaran matematika membantu anak terbiasa melakukan analisis dan mencari solusi terbaik terhadap suatu masalah. Penelitian ini menganalisis bagaimana pengaruh keterampilan proses matematis, psikologi kognitif terhadap kemampuan kolaborasi siswa kelas V sekolah dasar dalam pembelajaran matematika pada materi geometri. Penelitian dilakukan dengan menggunakan metode penelitian campuran dan penelitian eksplanatori sekuensial. Penelitian metode campuran mengandalkan dua jenis data, yaitu data kuantitatif dan data kualitatif untuk memecahkan suatu masalah yang ada. Siswa kelas V dijadikan subjek penelitian, dan dipilih masing-masing sekolah sebanyak 18 siswa, agar hasil yang diperoleh tidak bias, teknik pengumpulan data menggunakan simple random sampling. Penelitian ini menggunakan dua jenis pengujian yaitu uji asumsi dan uji hipotesis, dengan menggunakan uji homogenitas, uji linieritas, dan uji normalitas dalam uji asumsi, serta uji t dan uji regresi dalam pengujian hipotesis. Hasil penelitian menunjukkan terdapat pengaruh positif yang signifikan antara variabel keterampilan proses matematis siswa kelas V dengan karakter kolaborasi.

ABSTRACT

Learning mathematics is preparing students to be able to use a mathematical mindset in their daily lives. Learning mathematics helps children get used to doing analysis and finding the best solution to a problem. This study analyze how the effect of mathematical process skills, cognitive psychology on the collaboration abilities of fifth grade elementary school students in learning mathematics in geometry material. The research was conducted using mixed research methods and sequential explanatory research. Mixed method research relies on two types of data, namely quantitative data and qualitative data to solve a problem at hand. Fifth grade students were used as research subjects, and 18 students were selected from each school, so that the results obtained were not biased, the data collection technique used simple random sampling. This study uses two types of tests, namely the assumption test and hypothesis test, using the homogeneity test, linearity test, and normality test in the assumption test, as well as the t test and regression test in hypothesis testing. The results showed that there was a significant positive effect between the fifth grade students' mathematical process skills variables and the collaboration character.

1. INTRODUCTION

Education is something that must exist in every country. Education itself is a process of changing the attitude and character of someone from not knowing to knowing with teaching (Astalini et al., 2021; D. Darmaji et al., 2022; Rivani & Kurniawan, 2022). Education is a potential that exists in an individual that is used optimally and optimally. Education is a learning process to find out the knowledge and skills carried out by educators on a student (K. A. D. Darmaji et al., 2019; Kurniawan et al., 2019). Education is divided into four levels which are early childhood, elementary, middle and high. Elementary school education is an education that has the basics to continue to a higher level. Elementary school education has very important subjects to learn, one of which is mathematics. Learning mathematics in elementary schools aims to train students' knowledge, intelligence, personality, skills and morals (Ernawati et al., 2022; Rivani et al., 2022). Learning mathematics is preparing students to be able to use a mathematical mindset in their daily lives. Learning mathematics is also able to prepare students to be able to use the mindset of mathematics in their

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daily lives and in studying other sciences. Learning mathematics helps children get used to doing analysis and finding the best solution to a problem (Asrial et al., 2022; Kamid, Syaiful, et al., 2022; Syaiful et al., 2021). As for an example of material in class 5 mathematics learning geometric material. Build space in learning mathematics in grade 5 in learning mathematics in elementary schools. This spatial structure is included in the understanding of curved side geometric shapes. A spatial figure is a shape that has space and can be calculated for its contents or volume (Budiarti et al., 2022; Kamid, Rohati, et al., 2022; Putri, 2021). Spatial shapes have a variety of different forms, from flat shapes which have two dimensions, spatial shapes are shapes that have 3 dimensions and have volume. Examples of geometric shapes are spheres, cylinders, cubes, blocks, prisms, pyramids, and cones. The spatial learning in grade 5 elementary schools is taken from the 34 Batang Hari state elementary school and the Sungai Baung 14 state elementary school. In that case the importance of this learning is so that students have the ability to fully understand mathematical concepts, develop mathematical reasoning skills, problem solving skills, communicate mathematical ideas, and form the character of cooperation. to conduct a study (Asrial et al., 2020; Kamid, Winarni, et al., 2022; Kurniawan & Kartina, 2021).

In its development, the word psychology is then interpreted as the science of psychology or what is also often referred to as the science that investigates the presence of psychiatric signs. However, with the development of the times and also the modernization of the times, psychology is defined as a broader science, namely the study of human or human behavior. Thus, psychology is then understood as a basis or science that is used to study human behavior (Kinsella et al., 2015; Syaiful et al., 2021). Meanwhile, the notion of cognitive or what is also called cognition is the science that examines various things that are experienced by humans. For example, such as actors, new views, and so forth. But apart from that, there is no strong agreement regarding the standard definition of cognitive which comes from the absorption word, namely 'cognition'. So, when viewed from the two meanings described above, the notion of cognitive psychology is a science that in a perspective specializes in the scope of the perspective of human memory thinking. Furthermore, this psychology is then used to describe that humans are involved in an active information process. Even now, cognitive psychology is used as a branch of psychology whose function is used to study mental processes and in general it will discuss how to think, see, remember, and also how to learn a human being. It should be understood that the main focus of cognitive psychology is on how a person can obtain, process, and also store information (Putri, 2021; Zimmerman & Pons, 1990). So it's not surprising that some opinions state that the notion of cognitive psychology as a science that studies how the flow of information can be captured by the human senses. Then, the information that has been captured is processed into the human soul before it begins to be deposited into consciousness or it can also be manifested in the form of behavior, and the core of cognitive psychology itself is how a person works together with his own behavior, inspiration, and expectations so that it goes well. side by side.

Learning mathematics is preparing students to be able to use a mathematical mindset in their daily lives. Learning mathematics is also able to prepare students to be able to use the mindset of mathematics in their daily lives and in studying other sciences. Learning mathematics helps children get used to doing analysis and finding the best solution to a problem (Asrial et al., 2022; Kamid, Winarni, et al., 2022; Syaiful et al., 2021). As for an example of material in class 5 mathematics learning geometric material. Build space in learning mathematics in grade 5 in learning mathematics in elementary schools. This spatial structure is included in the understanding of curved side geometric shapes. A spatial figure is a shape that has space and can be calculated for its contents or volume (Budiarti et al., 2022; Kamid, Syaiful, et al., 2022). Spatial shapes have a variety of different forms, from flat shapes which have two dimensions, spatial shapes are shapes that have 3 dimensions and have volume. Examples of geometric shapes are spheres, cylinders, cubes, blocks, prisms, pyramids, and cones. The spatial learning in grade 5 elementary schools is taken from the 34 Batang Hari state elementary school and the Sungai Baung 14 state elementary school. In that case the importance of this learning is so that students have the ability to fully understand mathematical concepts, develop mathematical reasoning skills, problem solving skills, communicate mathematical ideas, and form the character of cooperation. to conduct a study (Asrial et al., 2020; Kamid, Syaiful, et al., 2022).

The impact of having students' process skills in learning mathematics stimulates students in science so that concepts and theories will be mastered more solidly. Familiarize students to study and work using (scientific) knowledge (Marzuki & Haq, 2018; Mustofa, 2021; Yusutria & Febriana, 2019). So that students can practice and theorize about the knowledge gained. besides that students can also be more proactive. KPS can make the learning process fun and students can find out the process and results of science. The impact that occurs if students do not have student process skills is the lack of self-confidence, cooperation and the character of other students. The reason is of course simple, namely so that students can re-create the concepts they have in mind and are able to organize them. Thus, a child's success in learning mathematics using a process skills approach is a change in the behavior of a child who does not yet

understand the math problem being studied so that he understands and understands the problem (Saregar et al., 2017; Wati et al., 2022).

Previous research on the topic under study entitled "The Effect of the Mind Mapping Method and Process Skills on Mathematical Problem Solving Ability in the Algebraic Structure Course" (Purwaningsih, 2017). Previous studies aimed at (1) to determine the effect of the mind mapping method through a process skills approach on problem solving abilities, (2) to determine the effect of student activity on problem solving abilities, (3) to determine the effect of the mind mapping method through a process skills and activity approach students on problem solving abilities.

The difference between previous research and current research is that in previous studies the variable mathematical process skills was used to determine the effect of problem solving abilities in algebraic structure courses. In the current study the mathematical process skill variable was used to determine the effect on the cooperative character variable of students at the 34 Batang Hari public elementary school and Sungai Baung 14 state elementary school in the high class. Base on those problem the purpose of this study was to determine the differences and influences of KPS on the character of cooperation in learning mathematics in elementary school classes with geometry material.

2. METHODS

This type of study uses mixed methods with a sequential explanatory study design. Mixed method research combines both quantitative data and qualitative data with the aim of getting answers to a problem. Sequential explanatory design and qualitative and quantitative Data collection takes place in two phases, with the main emphasis on quantitative methods assisted by qualitative methods (Fajriah et al., 2022; Indrawan & Jalilah, 2021).

The population in this study were high grade students at 34 Batang Hari Elementary School and Sungai Baung 14 Public Elementary School with 80 students. The research sample was classified into 2 elementary schools with a total sample of 18 students per school. In order to results obtained were not biased, this study used a simple random sampling technique as the data collection technique. The simple random sampling technique has the feature that each element of the whole population is equally likely to be selected and that by using this technique the sample members can be easily and fast (Agus Kurniawan et al., 2022; Sulistiyoning Budiarti et al., 2022).

This study used research instruments in the form of observation sheets, questionnaires and interview sheets. The questionnaire used measures the character of student cooperation in learning mathematics in geometric material, while the observation instrument is used to observe students' mathematical processing skills and cognitive psychology. The observation sheet used has a numerical scale with a 4 likert scale (very good, good, poor, and very poor), while the cooperation category scale consists of 5 likert (Very Good, Good, Sufficient, poor and Very poor). The results obtained from the questionnaire were strengthened by interviews with teachers who taught grade 5 mathematics. Indicators of student ability in this study are presented in Table 1.

Table 1. Indicators of Cooperation, Mathematical Process Skills, and Cognitive Psychology

Cooperation	1. Willing to accept responsibility	K1 K2 K3 K4 K5 K6
	2. Light hands help a group of friends in carrying out their duties	K7 K8 K9 K10 K11 K12 K13 K14
Mathematical Process Skills	1. Observation	O1 O2 O3 O4 O5 O6 O7
	2. Measure	M15 M16 M17 M18 M19 M20 M21
	3. Conclusion	K27 K28 K29 K30
Cognitive Psychology	1. Attention	O8 O9 O10 O11 O12
	2. Memory	M22 M23 M24 M25 M26

Table 1 describes the research variables used and the indicators measured. Where, in this study the variable of cooperation is focused on indicators of willingness to accept responsibility and helping a group of friends in carrying out their duties. Meanwhile, the mathematical process skill variable is focused on observation, measurement, and conclusion indicators. Furthermore, the assessment categories of the cooperation variable indicators are presented in Table 2.

Table 2. Cooperation Indicator Category

Category	Willing to Accept Responsibility	Light Hands Help a Group of Friends in Carrying out their Duties
Very poor	6 – 10.8	8 – 14.4
Poor	10.9 – 15.6	14.5 – 20.8
Sufficient	15.7 – 20.4	20.9 – 27.2
Good	20.5 – 25.2	27.3 – 33.6
Very good	25.3 – 30	33.7 – 40

Table 2 describes the assessment categories used on the cooperation variable, where the indicators on the cooperation variable have five assessment categories. Furthermore, the assessment category of variable indicator of mathematical process skills are presented in Table 3.

Table 3. Mathematics Process Skills Assessment Category

Category	Observation	Measure	Conclusion
Very Poor	7 – 12.25	7 – 12.25	4 – 7
Poor	12.26 – 17.5	12.26 – 17.5	8 – 10
Good	17.6 – 22.75	17.6 – 22.75	11 – 13
Very Good	22.76 – 28	22.76 – 28	14 – 16

Table 3 describes the assessment categories used on the process skills variable, where the indicators on the cooperation variable have four assessment categories. the assessment category of the variable indicator of cognitive psychology are presented in Table 4.

Table 4. Cognitive Psychology Assessment Category

Category	Cognitive Psychology
Very Poor	4 – 7
Poor	8 – 10
Good	11 – 13
Very Good	14 – 16

Table 4 describes the assessment categories used on the cognitive psychology variable, where the indicators on the cooperation variable have four assessment categories. Table 5 show a grid of interviews submitted to the respondents.

Table 5. Interview Grid

No.	Interview Grid
1	The form of cooperation that students have at Primary School 14 Sungai Baug and Primary School 34 Lotus
2	Forms of students' process skills when learning mathematics took place at Primary school 14 Sungai Baug and Primary school 34 Lotus.
3	A description of the cognitive psychology that students have when learning mathematics takes place at SD Negeri 14 Sungai Baug and SD Negeri 34 Teratai.

The data obtained is in the form of two types of data, quantitative data and qualitative data. The case where quantitative data was obtained from questionnaires about students' reasoning skills was reinforced by the results of interviews with the math teacher at the school where the students studied. Quantitative data analysis uses statistics, namely descriptive statistics and parametric inferential statistics. Quantitative data were analyzed using descriptive statistical analysis and parametric inferential. Descriptive analysis is presented in tables of frequency, percentage, average, median, min and max and for descriptive parametric inferential in the form of normality assumption tests, linear, and regression hypotheses.

3. RESULT AND DISCUSSION

Results

From the tests performed, the assumption was tested and the hypothesis was tested. Assumption testing, if the data used is normal, linear and homogeneous, it is continued with hypothesis testing. In addition, quantitative indicators data ready to take charge are presented in [Table 6](#).

Table 6. Indicators of Willingness to Accept Responsibility

School	Categori	Interval	F	Percentage (%)	Mean	Median	Min	Max
Primary School 34 Teratai	Not Very Good	6 – 10.8	-	-	20.88	21	17	29
	Not Good	10.9 – 15.6	-	-				
	Enough	15.7 – 20.4	8	44.44				
	Well	20.5 – 25.2	9	50				
Primary School 14 Sungai Baung	Very Good	25.3 – 30	1	5.55	20.66	20	16	27
	Not Very Good	6 – 10.8	-	-				
	Not Good	10.9 – 15.6	-	-				
	Enough	15.7 – 20.4	10	55.55				
	Well	20.5 – 25.2	7	38.88				
	Very Good	25.3 – 30	1	5.55				

[Table 6](#) illustrates the level of cooperation of fifth grade primary school students in learning mathematics with indicators of willingness to accept responsibility. In the table it can be seen that the two research samples used have a good level of willingness to accept responsibility, this can be observed observed the average value of the two research samples. The average value of primary school 34 lotus is 20,088 and Primary school 14 Sungai Baung is 20.66. Furthermore, the quantitative indicator data helps group mates in carrying out their duties in [Table 7](#).

Table 7. Indicators of Helping a Groupmate in Carrying out their Duties

School	Categori	Interval	F	Percentage (%)	Mean	Median	Min	Max
Primary School 34 Teratai	Not Very Good	8 – 14.4	-	-	28.5	27.5	24	35
	Not Good	14.5 – 20.8	-	-				
	Enough	20.9 – 27.2	9	50				
	Well	27.3 – 33.6	6	33.33				
Primary School 14 Sungai Baung	Very Good	33.7 – 40	3	16.66	28.5	28	21	37
	Not Very Good	8 – 14.4	-	-				
	Not Good	14.5 – 20.8	-	-				
	Enough	20.9 – 27.2	7	38.88				
	Well	27.3 – 33.6	10	0.55				
	Very Good	33.7 – 40	1	5.55				

[Table 7](#) illustrates the level of cooperation of fifth grade primary school students on the indicator of light hand helping a groupmate in carrying out their duties in learning geometric mathematics. The table above describes the level of math processing skills of fifth grade students on the completeness indicator in learning geometry. From the table it can be seen that the survey sample of 34 elementary schools in Teratai has a level of math processing skills with poor mastery indicators. This is explained by the number of half of the samples that fall into the very bad to good categories. Where there are 13 students who fall into that category. In the table it can be seen that the two research samples used have the same level of cooperation with the indicator of being light-handed helping a groupmate in carrying out their duties well, this can be observed in the mean value of the two research samples. Furthermore, quantitative data on the variable mathematical process skills with observation indicators presented in [Table 8](#).

Table 8. Table of Descriptions of Mathematical Process Skills with Observation Indicators

School	Categori	Interval	F	Percentage (%)	Mean	Median	Min	Max
Primary School 34 Teratai	Very Poor	7 – 12.25	4	22.22	16.16	17	8	24
	Poor	12.26 – 17.5	8	44.44				
		17.6 – 22.75	5	27.77				
	Good	22.76 – 28	1	5.55				

School	Categori	Interval	F	Percentage (%)	Mean	Median	Min	Max
Primary School 14	Very Good							
	Very Poor	7 – 12.25	1	5.55				
	Poor	12.26 – 17.5	5	27.77	18.66	18.5	10	25
	Good	17.6 – 22.75	8	44.44				
Sungai Baung	Very Good	22.76 – 28	4	22.22				

Table 8 describes the level of math processing skills of fifth graders on the completion indicator in learning geometric shapes. From the table, it can be seen that the survey sample of 34 primary schools in Teratai have a level of math processing skills with poor completion indicators. Although the survey sample is in primary school 14, Sungai Baung's mathematical processing skills level with good indicators is completed. This can be seen in the mean value of the two survey samples.

In the first test, a measurement test involved of a normality test and a homogeneity test is performed. If the data used are in accordance with the applicable terms and conditions, you can proceed with the hypothesis test, which consists of the t test and the regression test. The level of indicators measuring math learning skills is show in Table 9.

Table 9. The level of Indicators Measuring Math Learning Skills

School	Categori	Interval	F	Percentage (%)	Mean	Median	Min	Max
Primary School 34 Teratai	Very Poor	7 – 12.25	-	-				
	Poor	12,26	8	44.44				
	Good	17,5	8	44.44	18.38	19	15	23
	Very Good	17.6	2	11.11				
Primary School 14 Sungai Baung	Very Poor	22.75	1	5.55				
	Poor	22.76 – 28	5	27.77		19		
	Good	7 – 12.25	11	73.33	18.27		11	23
	Very Good	12.26	1	5.55				

Table 9 describes the level of math processing skills of fifth grade primary school students on measuring indicators in learning geometric shapes. In the table it can be seen that the two research samples used have a good level of mathematical process skills with good measuring indicators, this can be observed in the mean value of the two research samples. Furthermore, the quantitative data of the mathematical process skills variable with the conclusion indicators can be seen in Table 10.

Table 10. The Level of Mathematics Learning Skill Indicator Conclusion

School	Categori	Interval	F	Percentage (%)	Mean	Median	Min	Max
Primary School 34 Teratai	Very Poor	4 – 7	2	11.11				
	Poor	8 – 10	8	44.44				
	Good	11 – 13	7	38.88	10,16	10	4	14
	Very Good	14 – 16	1	5.55				
Primary School 14 Sungai Baung	Very Poor	4 – 7	1	5.55				
	Poor	8 – 10	6	33.33		19		
	Good	11 – 13	7	38.88	14,27		11	23
	Very Good	14 – 16	4	22.22				

Table 10 illustrates the level of math processing skills of fifth grade primary school students on the conclusion indicator in learning geometric shapes. In the table it can be seen that the research sample at primary school 34 Teratai has a level of mathematical process skills with poor conclusion indicators. While the research sample at primary school 14 Sungai Baung has a level of mathematical process skills with good conclusions indicators. This can be observed in the mean value of the two research samples. The following are descriptive statistics from cognitive psychology is show in Table 11.

Tabel 11 . Descriptive Statistics on Student Cognitive Psychology

School	Categori	Interval	F	Percentage (%)	Mean	Median	Min	Max
Primary School 34 Teratai	Very Poor	4 – 7	0	11.11	10.16	10	8	14
	Poor	8 – 10	10	44.44				
	Good	11 – 13	8	38.88				
	Very Good	14 – 16	0	5.55				
Primary School 14 Sungai Baung	Very Poor	4 – 7		5.55	14.27	19	10	23
	Poor	8 – 10	7	33.33				
	Good	11 – 13	7	38.88				
	Very Good	14 – 16	4	22.22				

Base on [Table 11](#) explain that SD 34 lotus has 10 students in the bad category and 8 students in the good category. Meanwhile, SD Negeri 14 Sungai Baung has 7 students in the bad category, 7 students in the good category and 4 students in the very good category.

Prerequisite Test

In the test, the assumption test is carried out first, which consists of a normality test and a homogeneity test. If the data used is in accordance with the terms and conditions that apply, then you can proceed with hypothesis testing which consists of the t test and regression test. The result of normality test is show in [Table 12](#).

Tabel 12. Normality Test

	School	Schooln	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
			Statistic	df	Sig.	Statistic	df	Sig.
KPM	Primary Schooln	34	0.056	20	0.176*	0.988	20	0.671
	Batang Hari							
Cooperation	Primary Schooln	14	0.051	20	0.176*	0.992	20	0.724
	Sungai Baung							
Cognitive Psychology	Primary Schooln	34	0.069	20	0.200*	0.985	20	0.661
	Batang Hari							
	Primary Schooln	14	0.055	20	0.200*	0.973	20	0.641
	Sungai Baung							
	Primary Schooln	34	0.049	20	0.200*	0.934	20	0.651
	Batang Hari							
	Primary Schooln	14	0.055	20	0.200*	0.976	20	0.451
	Sungai Baung							

Base on [Table 12](#) the data used is normally distributed. With significant values at Kolmogorov-Smirnov of 0.176 and 0.20. This indicates that the data used is normal. This is evidenced by a significant value of more than 0.05. The homogeneity test results are as follows. The test results are show in [Table 13](#).

Tabel 13. Homogeneity Test

		Levene Statistic	df1	df2	Sig.
KPM	Based on Mean	0.085	1	42	0.751
	Based on Median	0.145	1	42	0.780
	Based on Median and with adjusted df	0.145	1	40.189	0.771
	Based on trimmed mean	0.133	1	42	0.761
Cooperation	Based on Mean	1.068	1	32	0.391
	Based on Median	996	1	32	0.392
	Based on Median and with adjusted df	926	1	33.263	0.392
	Based on trimmed mean	1.052	1	32	0.393
Cognitive Psychology	Based on Mean	1.068	1	32	0.376
	Based on Median	996	1	32	0.387
	Based on Median and with adjusted df	926	1	33.263	0.372
	Based on trimmed mean	1.052	1	32	0.397

Base on [Table 13](#) it is known that the variances of KPM, cooperation, and cognitive psychology in SD Negeri 34 Batang Hari and SD Negeri 14 SUNGAI BAUNG are homogeneous. This can be seen from the results of the table where the Based on mean significance value is obtained more than 0.05. The significant values based on the mean obtained were .751 for KPM, 0.391 for cooperation and 0.376 for cognitive psychology.

Hypothesis testing

Tabel 14. T-Test

				Levene's Test for Equality of Variances			
				F	Sig.	t	Sig. (2-tailed)
Primary Schooln	34	KPM	Cooperation	0.143	0.001	2.567	0.005
Batang Hari Primary Schooln	14			0.169	0.003	2.479	0.000
			Cognitive Psychology				
Sungai Baung							

Base on [Table 14](#) there are differences between KPM, cooperation and cognitive psychology at SDN 34 Batang Hari and SDN 14 BAUNG SUNGAI. This can be seen from the significant results obtained at 0.01 for SDN 34 Batang Hari and 0.03 for SDN 14 BAUNG SUNGAI. Determination of significant value which states that normally distributed data must be less than 0.05. for the regression test conducted in this study are show in [Table 15](#).

Tabel 15. Regression Test Cooperative Character , Mathematical Process Skills and Cognitive Psychology

R	R Square	Adjusted Square	Std. Error of the Estimate
0.867*	0.062	0.804	4.073

Based on [Table 15](#) show the results obtained, the R square results obtained by the character of cooperation and mathematical process skills are R square $0.062 \times 100 = 6.2\%$.

Tabel 16. Hypothesis Regression Test with ANOVA the Character of Cooperation, Mathematical Process Skills, and Cognitive Psychology

Model	Sum of Squares	Df	Mean Square	F	sig
Regression	13.127	1	13.834	0.842	0.702
Residual	222.275	41	14.876		
Total	223.456	42			

Based on the [Table 16](#), the significant value obtained is 0.702, so this shows that the significant value obtained is > 0.005 .

Tabel 17. Regression Test of the Character of Cooperation, Mathematical Process skills, and Cognitive Psychology

Model	Unstandardized Coefficients		Standardized Coefficients	t	sig
	B	Std. Error	Beta		
KPM><	6.897	13.753		0.234	0.860
Cooperation><	0.153	0.169	0.384	0.876	0.346
cognitive psychology	0.888	0.246	0.760	3.567	0.706

Based on [Table 17](#), there is an influence between mathematical process skills and the character of cooperation in mathematics. This is evidenced by the sig value < 0.05 . Significant results on KPM obtained were 0.860, cooperation was 0.346, and cognitive psychology was 0.706.

Discussion

The results of the research conducted show that the 5th graders of 14 Sungai Baug Primary School have better math processing skills than the 5th graders of 34 Teratai Primary School, this showed at the mean value in Table 6. and Table 8 On observing the variable indices and inferring the mathematical process capabilities of geometric materials. The findings were also supported by an interview in which an educator from PRIMARY SCHOOL 34 Teratai stated that their 5th grade students were still not performing well in mathematics. This is demonstrated by the passive attitude of the students.

In this study, hypothesis test also indicates a gap between the 5th grade students of 34 Teratai ELEMENTARY SCHOOL and 14 Sungai Baug ELEMENTARY SCHOOL, this can be seen in the significance value displayed which is lower than 5%. Based on the results of the regression test in table 15 Based on the results of the regression test in table 15 The regression test that was carried out also shows that mathematical process skills of fifth grade students have a significant impact on the character of cooperation and their cognitive psychology in learning geometric shapes. Therefore, the mathematical process skills of fifth grade students have a positive influence on the character of cooperation in learning geometric shapes.

Previous research on the topic under study entitled “Pengaruh Metode Mind Mapping dan Keterampilan Proses terhadap Kemampuan Pemecahan Masalah Matematis Mata Kuliah Struktur Aljabar” (Purwaningsih, 2017). Previous studies aimed at (1) to determine the effect of the mind mapping method through a process skills approach on problem solving abilities, (2) to determine the effect of student activity on problem solving abilities, (3) to determine the effect of the mind mapping method through a process skills and activity approach students on problem solving abilities. What make it differentiate from research and current research is, in previous studies, altered mathematical processing skills were used to determine the effect of problem solving in structural lessons. algebraic structure. Other research emphasizes the character of any collaboration contained in mathematics (Qurohman et al., 2019). In this study, it has not been seen how the influence of mathematical process skills on the character of student cooperation in the mathematics subject matter of geometry . In the current study the variable mathematical process skills was used to determine the effect on the cooperative character variable of students at PRIMARY SCHOOLN 34 Batang Hari and PRIMARY SCHOOLN 14 Sungai Baug in the high class.

Learning mathematics requires students to master certain skills as external competencies (Purwanti & Alrizal, 2022; Rakhim et al., 2019). Observation process skills are one of the skills needed in learning mathematics, this is because students are required to observe the big picture of the problem so they can find a solution. Observation process skills can be developed in various ways, one of which is through students' cooperation character (Mahardi et al., 2019; Syahrial et al., 2022). The character of cooperation can help students in observing a problem together, so that students have various points of view on the problem being observed, so that participants can observe a problem even better.

Not only in observing a problem, in carrying out a mathematical measurement students are required to be able to make measurements correctly and precisely. A student's cooperative character can certainly help them when taking measurements (Erna et al., 2021; Kamid et al., 2021). Good measurements are carried out repeatedly, therefore the character of cooperation can help students improve their mathematical process skills in measuring indicators (Putra, 2017; Wati et al., 2022). The mathematical process skills of measuring indicators can help students find out the conditions that occur in the real world, not only that measuring can help students to collect information which is then processed in solving problems.

Problem-solving is a crucial aspect of cognitive psychology and math skills. It involves breaking down complex problems into smaller, more manageable parts, identify patterns and generate possible solutions through analysis. Good cognitive abilities establish the foundation for solving mathematical problems, which in turn fosters the development of math skills. Mathematical process skills the conclusion indicator focuses on students' skills in drawing conclusions from the activities they carry out. Skills in drawing conclusions is a very important skill, it be an indication of the success or failure of a learning process (Muchtar & Suryani, 2019; Wahono, 2018). Mathematical process skills like communication and reasoning are developed when students participate in cooperative classroom activities where they can share ideas and interact with their peers to arrive at conclusions. Good cognitive abilities also allow students to articulate their reasoning and critique the reasoning of others, leading to deeper understanding and greater competency in mathematical processes (Fajriah et al., 2022; Sumarni et al., 2019). Furthermore, the character of student cooperation plays a significant role in the development of mathematical process skills. Strong teamwork, communication, and collaboration skills have a positive impact on students' overall performance in math. When students learn to work together, share ideas, and resolve conflicts, they strengthen their problem-solving and critical thinking abilities, which are essential to mathematical process skills.

This research has differences compared to previous studies which has been done by previous studies where this research focuses on how the influence of mathematical process skills on student cooperation (Purwaningsih, 2017; Soucy McCrone, 2005). This study was carried out with the aim of understanding the variables that can affect the characteristics of cooperation, one of the requirements of education in Indonesia. Not only that, this study also chose the variable mathematical process skills which are the demands of global education which requires students to have the skills to collect information which then communicate the conclusions that students get in the process of gathering information in the learning process.

Even so, this study has a weakness in that the number of research samples used is only limited to 10% of the population, due to limited resources and time, so the results obtained are less representative. Nonetheless, taking 10% of the population enough to provide sufficient statistical power to detect significant associations between variables or significant differences between groups. So the results obtained are less representative. So the researchers suggest using a sample that can represent the research population, so that the research results can describe the level of mathematical process skills and the character of cooperation that is more accurate for the research population used.

4. CONCLUSION

This study was conducted in two schools, 34 Terathai Primary School and 14 Sungai Baung Primary School, with a population of 5th grade. Aim of this study was to clarify how impactful of mathematics processing ability on cooperation in mathematics learning in fifth graders. The results of this study show differences between the two schools he used as his research topic. There also a significant positive effect between the three variables used. This three research variables used are of great importance as they are one of the educational requirements that students should have, and it is the duty of educators to help students develop their potential. Overall, cognitive psychology and mathematical process skills are closely related. Effective cognitive abilities as well as cooperative classroom activities and better communication skills can help students develop their math skills and foster a positive attitude towards math and learning.

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