Curiosity and creative characters: The impact on students' numerical ability

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ARTICLE INFO

ABSTRACT

The study aims to determine the numerical ability improvement in terms of curiosity and creative character education. The study employs the descriptive quantitative method with survey techniques. The cluster random sampling technique selected 120 students from SMP Islam El-Syihab and MTSN 1 Bandar Lampung. Three classes were chosen from each school which consisted of the seventh, eighth, and ninth grades. Each class consisted of twenty students as the respondents. The analysis technique used was the multiple linear regression to investigate the effect of curiosity and creative characters on students' numerical abilities. The results showed that the curiosity character had a more significant influence on students' numerical abilities (0.870 or 87%) than the creative character (0,294 or 29%).

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INTRODUCTION

Education is not merely a knowledge transferring process from teachers to students (Anwar et al., 2021; Syazali et al., 2021; Widiansyah, 2018; Willy Yuberto Andrisma, 2007). Education is a process of character and abilities construction to create certain circumstances or situations in social life (Purba et al., 2019; Purnamasari, 2017; Wahyudin, 2018; Yuliana, 2017). Every individual is required to receive education from an early age. However, educational errors are often occurring in Indonesia, proven by emphasizing the test scores to determine the success of graduation and paying less attention to morals and characters (Salsabila & Firdaus, 2018). Character education is not a new phenomenon in Indonesian education. Character

education is an educational movement that supports students' development, including social growth, emotional development, and ethical development (Samain & Hariyanto, 2019; Siregar et al., 2019). Character education is defined as a school's plan complied with community institutions to shape one's behavior. Ki Hajar Dewantara is the father of Indonesian education. He stated that education is an effort to cultivate character, mind (intellect), and body (Mudana, 2019). These three aspects should not be separated in education so that educational goals can be achieved perfectly.

Achieving educational goals is not only the role of teachers or teaching staff. The elements of education must be involved to achieve the planned educational goals (Izza et al., 2020; Lazwardi, 2017; Sujana, 2019). Character education is essential in facing the 21st-century. A balance between competitive behavior and collaborative behavior regarding the implementation of character education is needed to achieve optimal learning objectives. Character education has been framed in the competency-based 2013 curriculum (Hartono, 2014; Hayati, 2013; Pertiwi, 2018; Suastra, 2010). Etymologically, the curriculum comes from the Latin "*curir*" which means runner, and "*curere*" which means a place to run (Agussalim & Ahmad, 2018). Character education values are applied in the implementation of the curriculum and subjects that are sustainable with these values(Mansur, 2020; Rostika & Zulkarnain, 2016), such as the application of democratic values in civic education (Fadhilaturrahmi et al., 2021; Perdana & Adha, 2020), respect for the environment taught in science subjects (Khusniati, 2012), and creative and curiosity values in mathematics lessons (Aripin & Purwasih,

2017; Fauzi et al., 2017; Schutte & Malouff, 2020; Sitorus & Masrayati, 2016). These values support the creation of educational goals relevant to the applied curriculum (Ilham, 2019; Lazwardi, 2017). The application is carried out by optimizing teachers' roles. Creative characters are actions to solve problems innovatively and dare to decide quickly and accurately. Also, someone with creative characters can display something extraordinary and always have new ideas (Amtiningsih et al., 2016).

Numerical abilities play an important role in various fields, such as education closely related to mathematics (Hermawan et al., 2019). Numerical abilities or counting come from the words ability and numeric (Badru, 2016; Irawan & Kencanawaty, 2017). Ability is a skill (Isworo et al., 2014), capability, or potential possessed by a person (Melani et al., 2019). Mathematical ability can be measured by deducting, problem, arithmetical, series, and numeric (Huda et al., 2020; Tambunan & Surya, 2019). Numerics are closely related to numbers and counting to store values in numbers (Afriza et al., 2016; Lestari, 2019). Based on the definition of ability and numeric, it can be concluded that numerical ability is a process of learning mathematics that cannot be separated from numbers and symbols. Students' numerical ability is an ability related to numbers and numeracy skills (Nur Hardiani, 2014). Numerical abilities are based on problem-solving abilities (Kusmawan et al., 2018; Siswono, 2008), classifying and distinguishing categories of information (Aripin & Purwasih, 2017), working with abstract concepts, and performing mathematical calculations quickly and precisely (Gunur et al., 2018; Rose, 2018). The numerical abilities are skills and accuracy in counting, which are closely related to the

often-tested knowledge in science, such as mathematics (Chen & Wang, 2021; Jelatu et al., 2019). Until now, education has been the most crucial consideration in a country. Therefore, education has a vital role in influencing one's ability. Improving the quality of education will rapidly affect one's abilities. However, the ability of Indonesian students are still far from good compared to the thinking ability of international students (Maskur et al., 2020; Rachman & Amelia, 2020). This is evidenced by the data on the acquisition of the test score on the first semester at SMP Islam EL-Syihab Bandar Lampung in numerical ability. The data can be seen in Figure 1.

Table 1. Numerical Ability Test Score

No	Class	First Semester Exam Scores of 2020			
		X < 40	40 ≤ x ≤ 70	X > 70,01	Total
1	**VII A**	12	8	5	25
2	**VII B**	3	15	7	25
3	**VIII A**	7	6	7	20
4	**VIII B**	12	6	0	18
5	**IX**	9	12	6	27
	Total	53	47	25	125

Based on Table 1, many students scored below the KKM (Criteria of Minimum Mastery). 43% of SMP Islam El-Syihab scored below 40, and 37% of students scored between 40 and 69. Students who passed the KKM only 20%. Therefore, in terms of quantity, mathematics learning has not been optimized.

The cause of the low KKM score cannot be known precisely. Therefore, the researchers were interested in researching the influence of curiosity and creative characters on students' numerical abilities.

METHOD

The research method used in this study was the quantitative descriptive method because the final result is a variable in numbers (Tight et al., 2016). The technique used in this study was a survey technique. This study examines the continuity of two independent variables and one dependent variable. The independent variable in this study was the creative and curious characters. The dependent variable in this study was numerical ability.

The study population was the SMP/MTs (junior high school) in Bandar Lampung in the academic year of 2020/2021. The researchers determined the samples by implementing the cluster random sampling technique. The samples were students and teachers of MTSN 1 Bandar Lampung and SMP Islam El-Syihab in the 2020/2021 academic year.

The researchers employed tests, questionnaires, observations, and documentation as the data collecting techniques. The steps of the study can be seen in the following Figure 1.
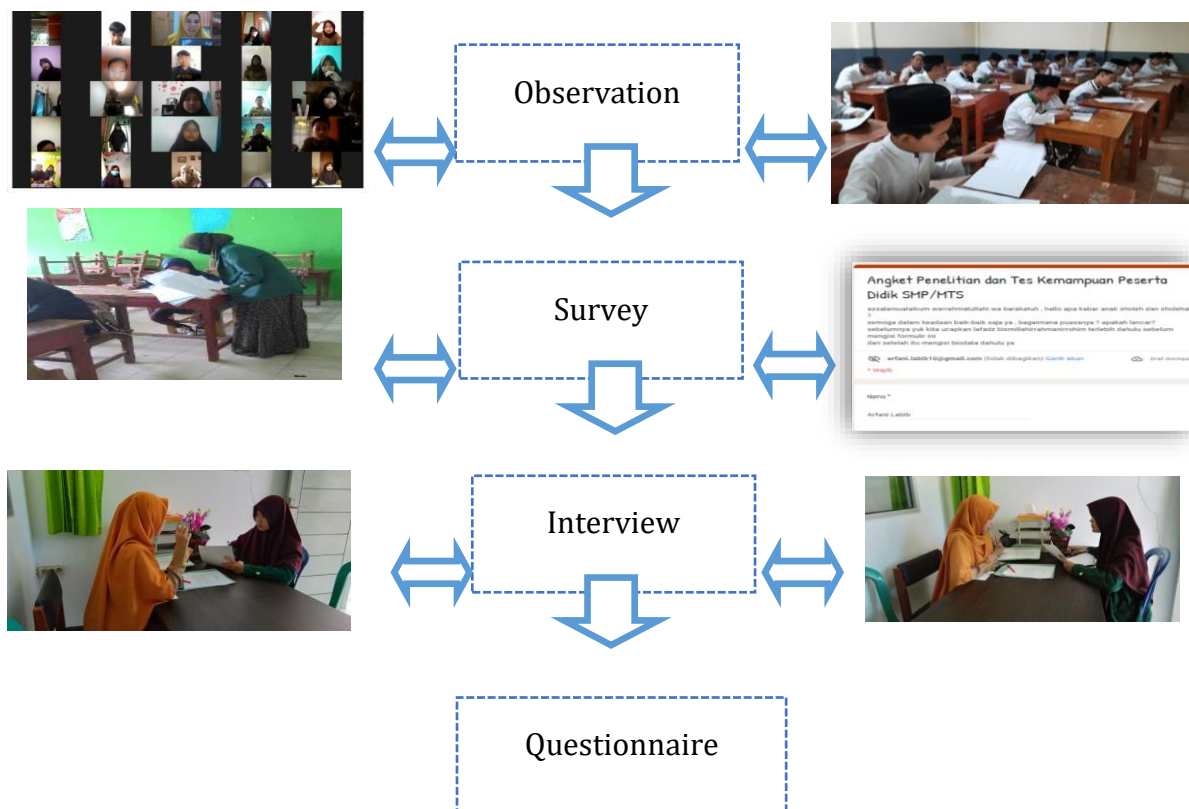
Figure 1. Research Flowchart

The researchers performed direct observations to see the students' character in offline and online learning. The researchers also observed how students responded to the material provided to determine the curiosity characters and how students solve problems based on the creative character. Furthermore, a survey was conducted to collect data supported by the results of interviews and questionnaires.

RESULTS AND DISCUSSION

The results and discussion were obtained from several stages of research testing. The initial testing was the feasibility testing of the research instruments. The instruments of this study were tests to investigate students' abilities and a questionnaire to test the students' characters. Furthermore, the normality test was performed to determine whether the residual value was normally distributed or not because a good regression has a normally distributed residual value or is close to normal (Malik, 2015). Thus, the normality test was carried out on the residual value, not on the variable. The results of the normality test are presented in Table 2.

Table 2. Normality Test Results

		Unstandardized Predicted Value
N		40
Normal Parameters	Mean	84.4500000
	Std. Deviation	.56391272
Most Extreme Differences	Absolute	.073
	Positive	.073
	Negative	-.061
Kolmogorov-Smirnov Z		.464
Asymp. Sig. (2-tailed)		.982
a. Test distribution is Normal.		

Based on Table 2, the significance value was 0.982, higher than α (0.05). Therefore, H_0 was accepted, which means that the error was normally distributed.

Further analysis to strengthen the results of the centralization rule was the inferential statistical analysis of the heteroscedasticity test.
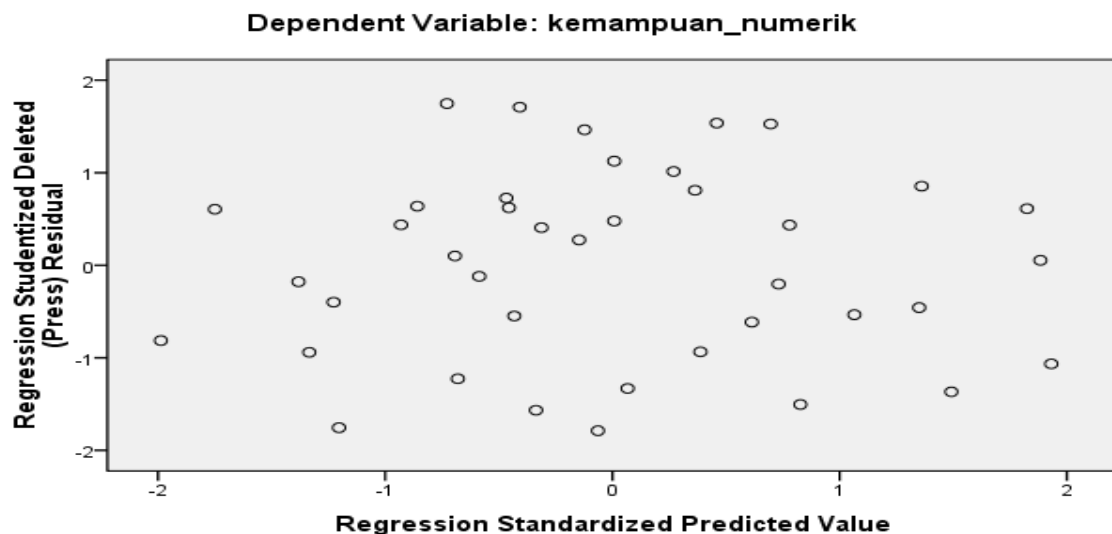
Figure 2. Heteroscedasticity Scatterplot

Based on Figure 2, the points spread randomly at the top and bottom or around 0 and do not form a wavy pattern that widens, narrows, and widens again. Therefore, it can be concluded that there was no heteroscedasticity, and a good regression model was met. Next, the multicollinearity test was performed. The purpose of the multicollinearity test is to determine whether or not there is a relationship between the independent variables (X) in multiple linear regression. The results of the multilinearity test are presented in Table 3.

Table 3. Multilinearity Test Results

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	T	Sig.	Tolerance	VIF
1	(Constant)	85.344	7.104		12.013	.000		
	curiosity	.074	.388	.032	.190	.850	.968	1.034
	creative	.134	.392	.057	-.342	.734	.968	1.034

Table 3 shows that the tolerance value of the curiosity and creative variables was 0.968, which shows that the data was higher than 0.10. The Variance Inflation Factory (VIF) value was 1.034, which means that the VIF value was lower than 10.00. The results confirmed that multicollinearity did not occur. Therefore, the test results can be assumed as reliable. The next test was the autocorrelation test. The autocorrelation test indicates that there are one or more variables that affect the dependent variable that is not included in the regression model. The results of the autocorrelation test can be seen in Table 4 below :

Table 4. Autocorrelation Test Results

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	.874a	.758	.857	9.625	.758	24,067	2	8	.000	1,890

It can be seen from the output of the autocorrelation test results that the DW value was equal to 1.890. Based on the Durbin Watson table with 120 students, the results were dU = 1.7361 and dL = 1.6684. Therefore, dU < DW < 4-dU, which explained that H_0 was accepted. In conclusion, there was no autocorrelation in the X-variable, so that it can be continued to the coefficient of determination test. The coefficient of determination (R^2) is used to measure the size of a percentage of the ability to influence the independent variable on the dependent variable. The results of the coefficient of determination (R2) test can be seen in Table 5.

Table 5. Coefficient of Determination

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.780a	.653	.567	3,528

Table 5 shows the results of the R square value being influenced by 0.653 or 65.3%. Therefore, the magnitude of the influence of curiosity and creative variables on numerical ability was 65.3%. Curiosity and creativity strongly influenced their numerical abilities based on column R of 0.780 or 78.66%. The following analysis was the simultaneous multiple linear tests to determine whether the independent variables in the regression model had a simultaneous effect on the dependent variable. The results of the simultaneous multiple linear tests can be seen in Table 6.

Table 6. Simultaneous Multiple Linear Test Results

ANOVAb						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3020,698	2	1540,698	101.275	.000a
	Residual	2616,677	178	15,228		
	Total	5637.375	180			

Based on Table 6, the p-value was 0.000 (lower than 0.05). Therefore, H_0 was rejected, or H_1 was accepted. There was an influence of the creative and curiosity characters simultaneously on students' numerical abilities. It can be concluded that the creative and curiosity characters simultaneously affected the numerical ability.

The sample came from a normally distributed population (*p-value* was higher than 0.05) based on the calculations. The heteroscedasticity test, multicollinearity test, and autocorrelation test were performed because the sample came from a normally distributed population. The three tests showed that the data did not show symptoms of heteroscedasticity, multicollinearity, and autocorrelation.

The hypothesis testing was performed using multiple linear regression. The first test was the coefficient of determination test. The students' numerical ability was affected by 65.3%. Curiosity and creative characters strongly influenced numerical ability by 78.66%. Next was the simultaneous multiple linear regression test to determine whether the independent variable in the regression model had a simultaneous influence on the dependent variable. Based on the results of the data analysis, the p-value was lower than 0.05. Therefore, H_0 was rejected, and H_1 was accepted.

In conclusion, the creative and curiosity characters simultaneously influenced students' numerical abilities. It can be concluded that the curiosity and creative characters had a simultaneous effect on numerical abilities, both on the students of SMP Islam El-Syihab Bandar Lampung and students of MTSN 1 Bandar Lampung. The multiple linear regression equation models obtained, namely:

$$\gamma = 67,815 + 0,870X_1 + 0,294X_2$$

The equation shows the X_1 coefficient was 0.870, which means that every increase in the X1 variable (curiosity character) will increase or

affect the Y variable (numeric ability) by 0.870 or 87% and the rest on other variables not studied. Likewise, the X_2 coefficient was 0.294 or 29%, and the rest of the other variables were not studied. Then, the constant of 67.815 means that if X_1, X_2 = 0, then Y = 67, 815. It can be seen that the curiosity character had more influence on numerical ability than the creative character.

This study consisted of three variables comprised of two independent variables and one dependent variable. The independent variables were curiosity and creative characters. The dependent variable was the students' numerical ability. The population in this study were students of MTsN 1 Bandar Lampung and SMP Islam El-Syihab Bandar Lampung. Three classes were taken from each school as samples. The samples from SMP Islam El-Syihab Bandar Lampung were class VIIA, VIIIA, IXA, where each class consisted of twenty students. The samples from MTSN 1 Bandar Lampung were class VIIA, VIIIB, IXA, with twenty students in each class.

The research at SMP Islam El-Syihab Bandar Lampung started from April 28, 2021 to May 5, 2021. The MTSN 1 Bandar Lampung research began on May 3, 2021, and finished on May 7, 2021. The purposes of this study were to see the students' numerical ability data and collect data used for hypothesis testing. The researchers conducted observations, distributed questionnaires, and administered tests to the students.

The research was conducted during online learning, so some activities were performed using the Google Form and Zoom platforms. The research process at SMP Islam El-Syihab Bandar Lampung was carried out offline and online. The research was conducted online on class VIIA, while classes VIIIA and IXA were performed offline. The research at classes VIIIA and IXA were carried out with a shift system where one class was divided into two and was carried out for two days after the school exam was held. The research process at MTSN 1 Bandar Lampung was carried out online using Google Form and Zoom in classes VIIA, VIIIB, and IXA. The researchers researched by adjusting learning regulations during the COVID-19 pandemic. Based on the results of observations via Zoom Meeting, class VIIA of SMP Islam El-Syihab Bandar Lampung was active because most students attended the zoom meeting on time and dared to ask questions and express opinions. Class VII A students always did the assignments given by the teacher via Google Form, listened and took notes on the explanation, and did not leave the Zoom room during the learning process. Research on class VIIIA and IXA were held offline after school exams. Most students were passive since they only listened and took notes without expressing their opinions.

At MTSN 1 Bandar Lampung, classes VIIA, VIII B, and IXA were generally active. The students were on time in logging in to Zoom meetings and in doing assignments. Also, the students were very enthusiastic in expressing their opinions. They were always excited after expressing their opinions. All students prayed at the beginning and the end of each lesson, led by one of the class members.

Furthermore, a questionnaire was distributed to strengthen the results of observations and determine students' numerical abilities. Students were given a

curiosity character questionnaire with the following indicators: 1) Enthusiastic (Agussalim & Ahmad, 2018); 2) Active which is an attitude that shows an active attitude in carrying out the activities (Manan, 2017); 3) Paying Attention to Objects which is an attitude to see an object in detail; 4) Knowing every object in particular which is a behavior that shows wanting to know more about something. On the other hand, the creative character questionnaire consisted of the following indicators: 1) Independent, which is an attitude that shows no dependence on others in completing tasks (Rachmayani, 2014); 2) Work hard, which is an attitude that shows a serious effort in achieving a learning goal; 3) High Motivation, which is an attitude to do the best to achieve what is desired; 4) Self-Confidence, which is a behavior that shows that you are confident in your abilities (Aen et al., 2019); 5) Curious, which is a behavior that constantly seeks to know in detail about something that is learned, seen, and heard.

Character differences affected students' abilities. Passive students obtained lower final scores in numerical abilities and must be improved. Several obstacles occurred during the implementation of the character-based 2013 curriculum in mathematics subjects (Irfan, 2020). Before starting a sub-chapter or new material, students must understand before the teacher explains. Sometimes it becomes an obstacle for the teachers because they must provide a post-test which will eventually become the teacher's evaluation of the extent to which students already know the teaching materials. Therefore, the teacher must provide character education appropriately. It is relevant with several previous studies that curiosity character can be strengthened through discovery learning (Kumala et al., 2019; Prasetyo & Fitri, 2018; Prihantoro, 2014), the role of teachers in the implementation of the 2013 curriculum (Siregar et al., 2019), the implementation of the scientific approach through the 2013 revised 5ms curriculum in Indonesia (Suyanto, 2018), the implications of curriculum renewal on ELT in Indonesia (Khoiri & Sunarno, 2018), and the difficulties of vocational high school teachers in implementing assessment in the 2013 curriculum in Yogyakarta Province, Indonesia (Retnawati et al., 2016).

Research conducted by Ujiti Cahyaningsih and Anik Ghufron entitled "The Effect of Using Problem-Based Learning Model on Creative Characters and Critical Thinking in Learning Mathematics" states that the application of problem-based learning model has a positive and significant influence on creative characters and critical thinking in learning mathematics (Cahyaningsih & Ghufron, 2016). 2). Research conducted by Eva Novalia and Ahmad entitled "Analysis of Mathematical Literacy Ability and Creative Characters in Synectics Learning in Class VIII Building Materials" states that there are differences in mathematical literacy abilities and creative characters after the application of Synectics learning (Novalia & Rochmad, 2017). Research conducted by Hardi Suyitno and Amin Suyitno entitled "Building Innovative and Creative Character through Mathematics" states values in mathematics education, innovation, creative character formation, and the application of values in

programmed, measurable, and structured learning activities(You et al., 2018).

CONCLUSIONS AND SUGGESTIONS

Based on the research results by referring to the research objectives, it can be concluded that: 1) The students' numerical ability is affected by the application of curiosity and creative character education. 2) Curiosity character has a better effect on the numerical ability compared to the creative character education because the curiosity character education has a higher r2 value (0.870 or 87%) compared to the creative character (0.294 or 29%).

Based on these conclusions, the researchers suggest that character education should be improved, not only curiosity and creative character education but also 18 other indicators of character education. Seeing the sound effects, the researchers suggest further research to see the impact of character education on other abilities and different approaches.

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