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The Implication of Relationship between Designing Woven Motive Skills and Logical Thinking in Mathematics Learning

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Abstract

This study aims to determine the relationship between the skill of weaving various types of rattan woven motifs with the ability of mathematical logical thinking of students in schools around the Galmantro Rattan Tourism Village of Cirebon Regency. The method used is a quantitative research method with a One-Shot Case Study research design. Data collection techniques used in the form of observation, tests, and questionnaires. The results of this study are (1) during the training, the respondents felt interested in knowing how to weave and the types of woven motifs for rattan crafts because in reality the respondents had never tried directly to weave rattan woven motifs; (2) based on the correlation coefficient test between weaving skills and the mathematical logical thinking test the t and t_table test values are 7.711 more than 2.045, so that the two variables have a significant relationship with the relationship level of 0.599 in the medium category.

Keywords: *weaving skills, woven motifs, mathematical logical thinking*

Abstrak

Penelitian ini bertujuan untuk mengetahui hubungan antara keterampilan menganyam berbagai jenis motif anyaman rotan dengan kemampuan berpikir logis matematis siswa di sekolah yang berada di sekitar Kampung Wisata Rotan Galmantro Kabupaten Cirebon. Metode yang digunakan adalah metode penelitian kuantitatif dengan desain penelitian *One-Shot Case Study*. Teknik pengumpulan data yang digunakan berupa observasi, tes, dan questionnaire. Hasil penelitian ini adalah (1) selama pelatihan berlangsung, para responden merasa tertarik untuk mengetahui cara menganyam serta jenis-jenis motif anyaman untuk kerajinan rotan karena nyatanya responden belum pernah mencoba untuk menganyam motif anyaman rotan secara langsung; (2) berdasarkan uji koefisien korelasi antara keterampilan menganyam dengan tes berpikir logis matematis didapatkan nilai hitung uji t dan t_{tabel} adalah $7{,}711 > 2{,}045$, sehingga kedua variabel tersebut memiliki hubungan yang signifikan dengan tingkat hubungan sebesar $0{,}599$ dalam kategori sedang.

Kata Kunci: *keterampilan menganyam, motif anyaman, berpikir logis matematis*

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Introduction

Weaving is an activity to forge materials that form a ribbon so that each other strengthens each other and because the technique is a recurring motif (Graha, 2000). Weaving techniques are actually often used for students as one of the crafts on cultural arts subjects. In the weaving process can also be attributed to mathematical subjects. The results of a study said that weaving can develop fine motor of children, because it can train the concentration of children, training eye and hand coordination, and also training thoroughness (Febriana & Kusumaningtyas, 2018). In addition, weaving activities can also lead students to think of simple logic that can escalate to formal thinking mathematically (Mawaddah, 2017). This is one way to bridge the local wisdom of the surrounding community with teachers in developing logical thinking skills conducted in mathematics learning activities. The woven material used is usually still in the form of easy-to-use materials, such as paper or pandan leaves. The materials used will later affect the woven motif.

Although weaving has been known by school-age children through cultural art subjects, weaving with rattan material itself is rarely practiced. Many of the school-age children are not yet aware

of the various forms of wicker that can be produced with rattan. whereas, weaving has been done by the community for generations. Even though there is an effort to inherit local wisdom from generation to generation, there is no guarantee that local wisdom will remain strong in facing globalization that offers a more pragmatic and consumptive lifestyle (Muchyidin, 2016).

The Village of Rattan Tourism consisting of five villages, namely Tegalwangi village, Kertasari, Karangsari, Megu Gede, and Setu Kulon which majority of the residents are the most popular as rattan craftsmen, have a lot of schools ranging from the level of early childhood education, Primary school level, junior high school level, to high school level. However, from all levels of the school there is no one that makes weaving activities with rattan as training of the skills of the students, so that weaving skills of various types of rattan woven motif is not much mastered by children age School. Whereas not only as a generation of successors who master the skill of weaving various types of motifs woven with basic material rattan for various kinds of crafts but weaving can also be related to the mathematical logical thinking ability of students.

Ethnomathematics Research in the sphere of education can be used to reveal ideas contained in certain cultural activities or certain social groups to develop a mathematical curriculum so that mathematics can have a form of and develop according to the development of the people of the wearer (Prabawati, 2016). For that, the research on the relationship between ethnomathematics and education should be examined more often in order to renew the education system in Indonesia, so that in this case research on the relationship of weaving skills various types of wicker motifs on rattan crafts with the ability of mathematical logical thinking students.

Method

The research method used is an experimental quantitative method, with the form of experimental used pre-experimental. The design that will be used in this research is One-Shot Case Study, which can be interpreted as a study in which there is a group given treatment and subsequently observed the results (Sugiyono, 2017). The population in this study was all the students of MTs Salafiyah Bode Cirebon Regency, while the samples used in this study were members of the extracurricular scouts at MTs Salafiyah Bode.

The data collection techniques to be used in this research are observations, tests, and questionnaires. Observation is a way of collecting materials that are done by conducting observations and records systematically on the phenomena that are being targeted to observe (Baskoro, 2017).
The test is a measuring instrument given to individuals (respondents) for answers, both in writing and orally, so that they can be known by the ability of the individual/respondent (Suharsaputra, 2012). The test is used to measure the mathematical logical thinking skills of the students given after students finish doing a series of weaving skills training with a multiple choice question form with four alternative answer options.

The questionnaire is a data collection technique done by giving a set of questions on a written statement to the respondent to be answered (Sugiyono, 2017). The questionnaire is used to know the student's responses to weaving training of various types of rattan woven motifs containing 20 items of a statement with five alternative options answer by using the Likert Scale presented in the form of a checklist.

Result and Discussion

The most important part of a study is how to collect and process data. Researchers collect data using observation sheets, tests, and polls with descriptive analysis as follows.

Table 1. Descriptive Analysis of Data Collection

	N	Minimum	Maximum	Mean	Std. Deviation
Observations	30	58	90	73.37	7.659
Tests	30	46	85	67.53	9.402
Questionnaire	30	75	86	80.00	3.280
Valid N (listwise)	30				

From the table above, you can know the minimum value, maximum, average (mean) and standard deviation of each data obtained. Observations made the assessment of students weaving skills consisting of speed, accuracy, and fragility. The test was done in the form of multiple-choice of 26 questions with the number of 30 respondents, namely all members of the extracurricular scout in MTs Salafiyah Bode. The questionnaire used in this research is useful to know the response of respondents associated with a statement of 20 items.

Student Response Results On Weaving Skills Training

In addition to obtaining data through observation and tests, researchers have also given the questionnaire to pre-defined respondents as secondary data to determine the student's response to the rattan weaving skill training provided with the following results.

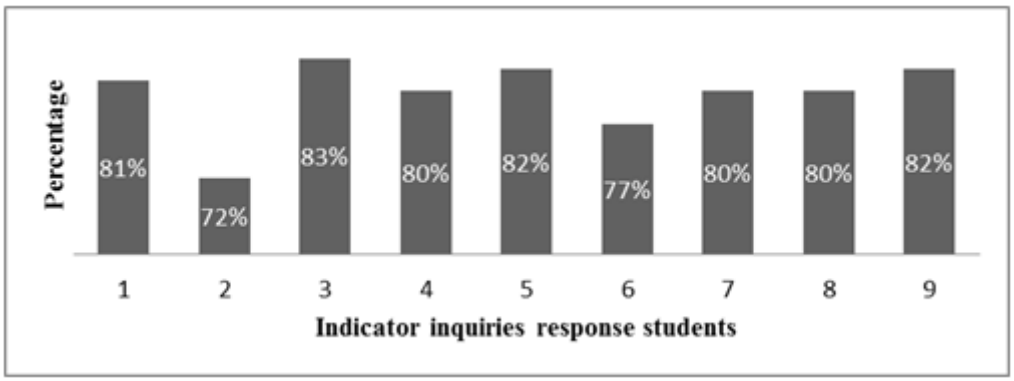

Figure 1. Recapitulation of Results of Student Response Questionnaire

Description:

1. Make relevant and meaningful knowledge about ethnomathematics (indicator 1)
2. Know the tools and materials used (indicator 2)
3. Check the student's knowledge of various types of wicker motifs on rattan crafts (indicator 3)
4. Guiding students in completing types of weaving motifs (indicator 4)
5. Conduct activities according to their talents and interests (indicator 5)
6. Growing the enthusiasm for students to have specific skills (indicator 6)
7. Linking cultures around with mathematics (indicator 7)
8. Update the knowledge that has been established by students (indicator 8)
9. Bring up responses to events, activities, or knowledge received (indicator 9)

Based on the diagram above, the highest percentage is found in the indicator (3), which is to check the students knowledge of various types of woven motifs on rattan handicrafts by 83%, while the lowest percentage on the indicator (2), namely knowing the tools and materials used amounted to 72%. The average percentage of all indicators is 80% in strong categories.

Results of Rattan Weaving Skills Training

Weaving crafts are one of the cultures that human owned since the first which aims to fulfill the needs of daily clothing and supplies (Patria & Mutmaniah, 2015). Weaving itself is included in one of the types of crafts, which is a branch of the art of two or three dimensions that have practical and ornamental, and can be made from various materials. The weaving principle is to utilize the transverse (horizontal) path commonly referred to as feed and path (vertical) called lumbar or warp which is made with overlapping alternately to unite (Sulastianto et al., 2008).

A woven motif appears as a result of the use of woven techniques, the use of ribbon variations, and colors used (Putri, A, & Wikarya, 2017). The motif is not detached in patterns that have a point of regard to creating an ornament that serves to decorate a field, space, or disposable objects so it has beauty (Angraini, 2013). According to Haryanto (2016), there are 11 types of rattan woven motif. But in this study only selected 5 of 11 types of woven motifs, namely Jruno Kembar Kecil motif, Anti Lurus

motif, Jruno Besar motif, motif Kelabang, and Silang Gedhek motif that can be distinguished based on the materials, colors, and techniques used.

Researchers observe the skills of weaving students in the classroom. This research Data obtained from observations in each training weaving various types of woven motifs with the criteria assessed is the speed, accuracy, and fragility of the assessment scale 1-4. Based on the analysis of the observation data that has been done in accordance with the indicators that have been determined can be recapitulated in the following diagram.

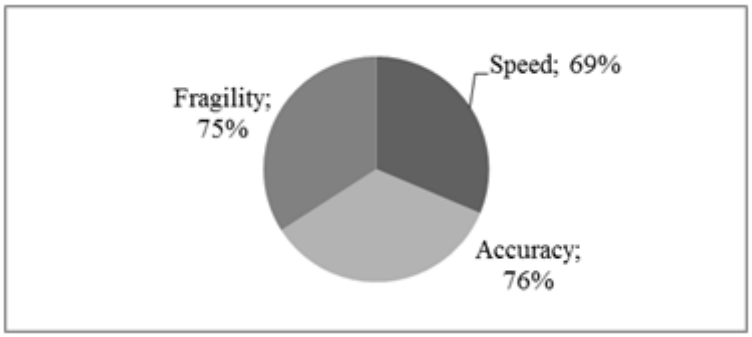

Figure 2. Recapitulation of Observation Results

Recapitulation of observation data based on the indicators that have been determined to result in the average percentage of 73% with a good category so that it can be concluded that the skill training weaving various types of rattan woven motif will give an impact on the logical thinking of students.

Student Mathematical Logical Thinking Test Results

Logical thinking can also be interpreted as the ability of a student to draw a legitimate conclusion according to the rules of logic and can prove that the conclusion is true (valid) in accordance with the previously known knowledge (Siswono, 2008). Problems or situations involving logical thinking require a structure, relationship between facts, arguments, and a series of reasoning that can be understood so that it can be concluded that logical thinking and reasoning are mutually appropriate (Meidasari, 2015).

Researchers have given a number of tests to respondents in a research class that amounted to 30 students with a mathematical logical thinking indicator, with an analysis recapitulation can be seen in the bar chart below.

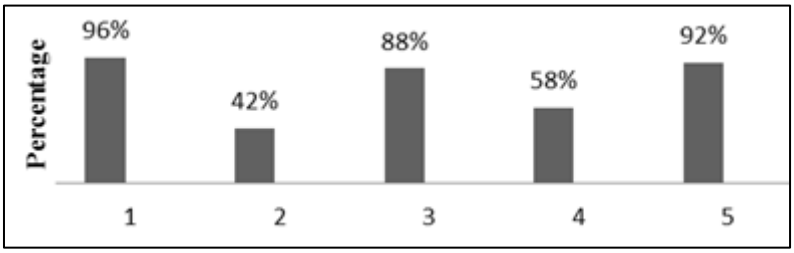

Figure. 3. Recapitulation of Mathematical Logical Thinking Test Results

Description:

1. Able to perform arithmetic calculations include simple calculations or rows or sequence of numbers (indicator 1)
2. Able to calculating algebraic operations (indicator 2)
3. Able to calculate geometry-related problems (indicator 3)
4. Able to draw conclusions logically (indicator 4)
5. Able to think logically and analytically in the face of problems (indicator 5)

The recapitulation of the above shows that the indicator with the highest percentage is an indicator that students are able to perform arithmetic calculations including simple calculations, as well as a

number of numbers or rows of 96% and the lowest, is Indicator students are able to perform the algebraic operations calculations by 42%. The average percentage of all indicators of the student's mathematical logical test is 75%. Thus, it can be concluded that the mathematical logical thinking tests of students belong to the good category.

Research Data Analysis

Test Normality

The normality test is aimed at knowing the data is normal or abnormal distribution using the help of SPSS 20.0 software. Researchers conducted a test of normality on observation data and test data, with the following results.

Table 2. Result Test of Normality

	Class	Kolmogorov-Smirnov[a]		
		Statistic	df	Sig.
The Results of Data Research	Observations	0.129	30	0.200*
	Tests	0.138	30	0.150

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Based on the output results above it can be noted that the significance value of the observation data 0,200 > 0.05 and the significance value of the test data 0,150 > 0.05. The significance value of both data is greater than 0.05 so that it can be concluded that all data is normally distributed.

Test Homogeneity

Test the homogeneity to know the data is homogeneous or not by using the help of SPSS 20.0 software, with the following results.

Table 3. Results of Homogeneity Test

Levene Statistic	df1	df2	Sig.
1.538	1	58	0.220

The test result of homogeneity above indicates that the value of significance 0,220 > 0.05 so it can be concluded that the research data is homogeneous.

Test Linearity

Good data should have a linear relationship between free variables and bound variables so that the data needs to be tested linearity to know which variables are tested to have a significant linear relationship or not. The following table linearity test results between free variables and assisted bound variables of SPSS 20.0.

Table 4. Results of Linearity Test

			Sum of Squares	df	Mean Square	F	Sig.
Mathematical Logical Thinking * Weaving Skills	Between Groups	(Combined)	1660.500	14	118.607	1.962	0.104
		Linearity	922.273	1	922.273	15.253	0.001
		Deviation from Linearity	738.227	13	56.787	0.939	0.541
	Within Groups		907.000	15	60.467		
	Total		2567.500	29			

Based on the test table linearity above, obtained the value of Sig. Deviation from Linearity of 0.541 which means more than 0.05, so it can be concluded that there is a linear relationship between the weaving of rattan by logical thinking mathematically.

Test Coefficient of Correlation

In connection with the assumptions of free variable data normality and bound variables are fulfilled and both variables have a significant linear relationship, then to know the level of relationship free variables and variables tied to the test Pearson Correlation with the help of SPSS 20.0 software with the following results.

Table 5. Correlation Coefficient Test Result

		Weaving Skills	Mathematical Logical Thinking
Weaving Skills	Pearson Correlation	1	0.599**
	Sig. (2-tailed)		0.000
	N	30	30
Mathematical Logical Thinking	Pearson Correlation	0.599**	1
	Sig. (2-tailed)	0.000	
	N	30	30

Based on the table of the correlation coefficient test results, the obtained significance value of 0.000 is smaller than 0.05. This means that there is a significant link between rattan weaving skills with the mathematical logical thinking of students. Output results are also obtained by the value of Pearson Correlation between wicker rattan with mathematical logical thinking of 0.599 which is interpreted according to the interpretation table of the correlation coefficient of R-value is in the medium category. Then it can be concluded that the skill of weaving rattan with the mathematical logical thinking students have a moderate correlation.

Hypothesis Test

Hypothesis testing aims to prove hypotheses with alternate hypotheses (Ha) as a proven hypothesis. Once a correlation index number is known to be 0.599, it will then be sought for the significance of the relationship using the T-test, with the calculation result of 7.711. Furthermore, the result is compared with the result of this with a value of 2.045, then obtained 7,711 > 2,045 which means Ho rejected and Ha accepted, so that it can be concluded that the variable weaving rattan skills associated with variables mathematical logical thinking students.

Discussion and its implication

The questionnaire instrument in this study consists of 9 (nine) appropriate indicators to know the student's response to the training of rattan weaving. The results of the poll data analysis showed that the indicator (3), which is checking the students knowledge of various types of woven motifs on rattan handicrafts has a percentage of the highest average of 83%, while the indicator has the lowest average percentage is an indicator (2), that is, knowing the tools and materials used amounted to 72%. This means that the respondents who live in an environment with many people who make rattan handicrafts but the respondents have never woven and do not know about the types of rattan woven motif so that the training is done Interesting to follow, while for weaving tools should be noted for its use because most are included in sharp objects.

The observation instrument used in this study consists of three indicators, namely speed, accuracy, and brittleness in weaving rattan. From the data analysis results previously explained, the highest average percentage is on the indicator of accuracy and fragility with a gain of 76%, while the speed indicator has the lowest percentage of 69%. This shows that the precision and brittleness in weaving rattan is preferred so that it will produce a good woven and have a selling value, although the speed in weaving is also worth noting in order to reach the number of targets required. The test instruments in this study consist of 5 (five) mathematical indicators of logical thinking. Data analysis results show that in the acquisition of the highest average percentage, the indicators of the students are able to perform arithmetic calculations including simple calculations as well as the line or sequence of a number as the highest of 96%. For indicators with the lowest average percentage acquisition, students are able to calculate the algebraic operation by 42%.

If connected between weaving skills and the student's mathematical logical thinking ability, the precision in weaving is reflected in the test indicators that students are able to perform arithmetic calculations including simple calculations as well as lines or rows a number. When doing weaving,

students think about the ranks or sequence of a number and do calculations to be interwoven between the feed and the warp precisely according to the desired motive. However, it was found that the speed in completing webbing inversely proportional to the accuracy and fragility of the woven. Because most students who complete a woven motif quickly have a result of less precise woven and not neat, while the students who do not very quickly produce the right wicker and more neat.

In addition, in the process of weaving is also necessary logical and analytical thinking ability to avoid the placement of the interwoven feed and warp which in this case in accordance with the fifth Test indicator, that is, students are able to think logically and analytical in the face of problems. It is in accordance with the research that the students who have high mathematical intelligence are more likely to understand problems and analyze and solve them quickly and have high learning outcomes (Suhendri, 2011), as well as other studies mentioning that mathematical logical thinking capabilities relate to the intelligence of mathematical logic, i.e., the intelligence that one has to analyze a problem logically, solves mathematical operations, and examine a problem scientifically (Kamsari & Winarso, 2018). However, in the second indicator, the students are able to perform the calculation of algebraic operations to have the lowest average percentage compared to other indicators, because when weaving algebraic calculations are not necessary.

Weaving is an activity that weaves and interweaving in overlapping and repeated so that unity produces a certain motif. The respondents who were given training were getting the average percentage of 75%. This means that the average percentage accrual on the test indicator is interconnected with the ability of the student in weaving skills. A supportive study says that ethnomathematics make one able to go through the process of logical thinking based on patterns and naturally occurring relationships that align with the logical thinking process, which is to be said able to think logically, one needs to understand the relationship and pattern of a problem that is then drawn in conclusion as problem-solving (Mawaddah, 2017). In addition, it is said that if teachers diligently pay attention to the environment and associate mathematical learning with the environment, then the potential logical thinking ability of students will grow (Saragih, 2006). In this case, the weaving activities are not separated from the patterns and the relationship between the feed and the warp, as well as weaving, is also a lot of things done in the neighborhood.

The study of ethnomathematics with this education can be used to understand the belief system, thinking, and mathematical behavior of a group which can then be used as the basis to provide meaningful mathematical learning for students (Hardiani & Putrawangsa, 2018). Based on the above discussion can be concluded that the activities of weaving various types of rattan woven crafts are associated with the ability of mathematical logical thinking students. This is characterized by the linkage between indicators of mathematical logical thinking tests with the observation of weaving activities, as well as the test results of the correlation data analysis that has been conducted. The implication of this research is that students can better understand the meaning of order/wrinkling, understand existing patterns, be critical in analyzing various patterns, be creative in creating new patterns, be able to solve problems related to patterns, the emergence of accuracy, perseverance/persistence (mathematical disposition), and also students can think systematically

Conclusion

This research resulted that there is a relationship between weaving skills of various kinds of woven motifs on rattan crafts with the ability of students' mathematical thinking. Weaving skills of various types of rattan wicker motifs can be used as an alternative to developing logical thinking skills of mathematics. This is an ethnomathematics-based learning approach. According to the studies that have been done, the ethnomathematics approach can be used as a bridge between learning mathematics conducted in class with mathematical elements in the surrounding environment, and weaving is one of the cultures that continue to flourish in society. By weaving, students can practice mathematics-related abilities. Weaving training can also be used as a means to preserve the culture of the surrounding community. If the community is more concerned about weaving culture in its environment, they can do training weaving in schools around, because actually, the students are interested to know more about the weaving and how to weaving rattan handicrafts, but there are no activities that support the school.

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