Measurement Method of Contribution Digital Literacy Proficiency and School Literacy Movement toward Reading Literacy Activity Index at Junior High School Students in Purbalingga City

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Abstract. This article describes a measurement method of contribution digital literacy proficiency and school literacy movement toward reading literacy activity indexes at junior high school students in Purbalingga City. The steps in this method consist of: a) making measurement design, b) determining population and sample, c) making research instruments, d) collecting data, e) conducting validity and reliability test, and f) analyzing data which consisting of analysis requirement test and analysis of research data. Hopefully, the explanation from the measurement method in this article, other research-related, can be carried out well so this article can be helpful for future measurement research.

Keywords: measurement method, contribution, correlation

1 Introduction

One of the skills in the 21st century that is important and needs to get focus and attention from the Indonesian government is the issue of literacy [11]. Unfortunately, the low reading culture is one of the crucial issues in the dynamics of Indonesian society today. Hasan [5] said that efforts to increase public interest in reading must base on the ability to read. Reading ability or skill is an initial requirement to access reading. After having reading skills, the next step is to build reading habits.

Based on research results from the Center for Educational and Cultural Policy Research in 2019, the reading literacy activity index (alibaca) of Central Java Province is in a low category, which is at 33.30 [6]. The alibaca index of Central Java Province immediately represents the alibaca index of 29 regencies and six cities in Central Java Province, including the Purbalingga Regency. It attracted the authors' attention to find factual data about the contribution of other

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variables that made the alibaca index of Purbalingga Regency fall into the low category, especially for junior high school students in Purbalingga City, the district capital.

Students' low digital literacy skills are suspected of causing the low literacy index of students in Purbalingga City. According to Saripudin and colleagues [1], digital literacy is needed for all aspects of human life, especially education. Digital literacy itself has the meaning as knowledge and skills to use digital media, communication tools, or networks in finding, evaluating, using, creating information and utilizing it in a healthy, wise, intelligent, careful, precise, and law-abiding manner in order to foster communication and interaction in everyday life [3]. There have not been too many specific studies that examine digital literacy [8].

Therefore, in the era of information technology, as it is today, the low level of digital literacy skills in students is thought to have been the cause of the low alibaca index in Purbalingga City, especially for junior high school students. Another factor suspected to be the cause of the low alibaca index in Purbalingga City is the ineffectiveness of the School Literacy Movement (GLS) activities. The School Literacy Movement is part of the National Literacy Movement program initiated by the government through the Ministry of Education and Culture in 2016. One of the supports for GLS is using the latest information technology, which has become an essential tool for modernizing schools [4]. However, the active implementation of GLS in Purbalingga City does not seem to be optimal; this looks from the low alibaca index in Purbalingga City. Therefore, apart from students' low level of digital literacy skills, the active implementation of GLS in Purbalingga City is also suspected to be the cause of the low Alibaca index in Purbalingga City. Based on the background of the problem described, the problem in this article is how to measure the correlation between digital literacy skills and the School Literacy Movement in the index of reading literacy activities for junior high school students in Purbalingga City.

2 Research Method

The method used in this article is descriptive. Sugiyono [10] states that the descriptive method is used to describe or analyze but is not used to make broader conclusions. Furthermore, Whitney conveyed that the descriptive method was fact-finding with the correct interpretation [12]. Thus, the theoretical study will be presented comprehensively and descriptively in this article to answer the formulation of the already determined problem.

3 Result and Discussions

Measurement Design

The initial stage in determining the measurement method is to make a design or pattern to describe the relationship between variables presented in the following figure.

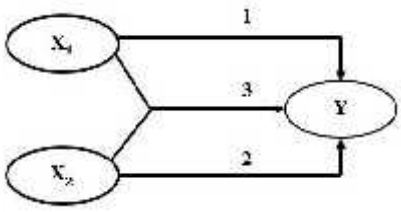

Fig. 1. Inter Variable Relationship Measurement Design

Description:
X_1 = digital literacy skills
X_2 = School Literacy Movement
Y = index of reading literacy activity

Population and Sample

The population is the entire research subject [7]. The population used in this correlation measurement is all junior high school students in Purbalingga City. Furthermore, sampling can use a cluster sampling technique (sampling area). According to Sugiyono [10], this area sampling technique is often used in two stages: determining regional samples from the research population and determining individuals used as research samples. The number of samples can use a ratio of 20-30% of the total population. The number of samples can be increased according to the ability of the reviewer/researcher. In research with a broad scope, the authors recommend a maximum sample threshold of 50%.

Research Instruments

The research instrument used in this measurement was collected using a non-test technique to give questionnaires to respondents/research samples. The preparation of the instruments for each variable consists of various stages, namely: (1) examining theories or concepts related to each variable; (2) identifying indicators for each variable; (3) developing operational definitions; (4) compiling an instrument grid, which is manifest in the form of a table of instrument specifications; (5) compiling instrument items complete with measurement scales; and (6) instrument testing. The measurement of the three variables used in this study uses a Likert scale, carried out by providing an answer scale to a given statement. The answer scale consists of four statements arranged in a row from the most positive to the most negative, or vice versa. The statements were strongly agreed, agree, disagree, and strongly disagree.

Data Collection Techniques

The measurement data collection uses a non-test technique in the form of a questionnaire/questionnaire. To support primary data collection, the author also uses data collection techniques of observation, documentation, and in-depth interviews with research subjects.

Validity and Reliability

Before the three research instruments were used, the instrument must be tested on members outside the research sample who still had the same characteristics to determine the validity and reliability.

a. Validity

The calculation of item validity in this study uses the Correlation Product Moment formula as follows [2]:

$$r_{x} = \frac{n(\sum x) - (\sum x)(\sum y)}{\sqrt{\{N(\sum x^2) - (\sum x)^2\}\{N(\sum y^2) - (\sum y)^2\}}} \quad (1)$$

Description:

r_x = correlation coefficient between question item score and total score sought

n = number of trial respondents

x = score of question items for i-item

x = total score

b. Reliability

The calculation of the reliability of the questionnaire in this study uses the Cronbach Alpha formula as follows [2]:

$$r_{alpha} = \frac{k}{k-1}\left(1 - \frac{\sum S_i^2}{S_t^2}\right) \quad (2)$$

Description:

r_{alpha} = test reliability coefficient

k = number of valid questions

S_i^2 = item score variance

S_t^2 = total score variance

Data Analysis Technique

a. Test Requirements Analysis

Before testing the hypothesis, the analysis requirements test was conducted, namely, the normality test using the Lilliefors technique. Normality testing is carried out through the following procedures or steps.

1) Observations x_1, x_2, ..., x_n are used as standard numbers z_1, z_2, ..., z_n by using the formula $z_i = \frac{x_1 - x_2}{s}$ (x and s are the average and deviation, respectively sample standard).

2) For each of these numbers and using the standard average distribution list, then calculate $F(z_i) = P(z \leq z_i)$

3) Next, the proportion of z_1, z_2, ..., z_n which is less than or equal to z_i, is calculated, if this proportion is stated by Sz_i, then $S(z_i) = \frac{\sum z_1, z_2 ... z_n \; y \quad \leq z}{n}$

4) Calculate the difference $F(z_i) - S(z_i)$, then determine the absolute value.

5) Take the most significant price among the absolute values of the difference. Mention this most considerable price, L_o. To accept or reject the null hypothesis, we compare this L_o with the Critical Value *L* taken from the list of Critical Values *L* for the Liliefors test for the chosen significance level. The criteria are: reject the null hypothesis that the population is normally distributed if the L_o obtained from the observation data exceeds the list. In this case, the null hypothesis is accepted [9].

b. Research Data Analysis

1) Descriptive Analysis

Descriptive data analysis is intended for descriptive data presentation by describing the acquisition of data that has been processed, collected, grouped, and analyzed. The descriptive analysis in this study includes: calculating the central tendency (measures converging), such as calculating the mean, mode, and median. In addition, the calculation of the tendency of the spread, such as the calculation of variance and standard deviation. Furthermore, in this descriptive data analysis, the researcher also explained the results of the preparation frequency distribution of the values of each variable, equipped with a histogram image of the frequency of the values of each research variable.

2) Inferential Analysis

Inferential data analysis is intended to test the hypothesis that has been proposed. The analysis technique used is statistical regression (simple and multiple) and correlation (multiple and straightforward). The steps are described as follows [9].

a) Looking for a simple regression equation for each independent variable with the dependent variable while simultaneously testing the significance and linearity for the obtained regression. The general form of the simple regression equation to look for is $\hat{Y} = a + bX$, where *a* is the intercept (constant) and *b* is the slope (coefficient of regression direction). To calculate the price of and is done by the formula:

$$a = \frac{(\sum Y)(\sum X^2) - (\sum X)(\sum XY)}{n\sum X^2 - (\sum X)^2} \quad (3)$$

$$b = \frac{n\sum XY - (\sum X)(\sum Y)}{n\sum X^2 - (\sum X)^2} \quad (4)$$

b) Test the significance of the simple regression equation Y over X_1 and Y over X_2. Testing the significance of the regression equation obtained is done by testing the null hypothesis (H_o), which states that the regression direction coefficient is not significant (equal to zero), against the alternative hypothesis (H_1) that the

regression direction coefficient is significant (not equal to zero). Meanwhile, the regression linearity test was checked by testing the null hypothesis (H_0), which states that the regression equation is linear, against the counter hypothesis (H_1) that the regression is not linear. The two null hypotheses were tested using the F-test statistical technique using the analysis of variance (ANOVA) table as follows to test the significance and linearity of the regression.

Table 1. Analysis of Variance Table (ANOVA) to test the significance and linearity of the Simple Regression equation $\hat{Y} = a+bX$

Source Variance	Dk	JK	KT	F
Total	N	$\sum \hat{Y}^2$	$\sum \hat{Y}^2$	-
Coefficient (a)	l	JK(a)	JK(a)	-
Regression (b/a)	l	JK(b/a)	$S_F^2 = JK(b/a)$	$\frac{S_F^2}{S_S^2}$
Remainder	n-2	JK(R)	$S_S^2 = \frac{JK(R)}{n-2}$	
Tuna Match	k-2	JK(TM)	$S_T^2 = \frac{JK(TM)}{k-2}$	$\frac{S_T^2}{S_G^2}$
Error	n-k	JK(E)	$S_G^2 = \frac{JK(E)}{n-k}$	

The criteria for testing the significance of the regression equation obtained are rejecting the null hypothesis, which states that the coefficient of the regression direction is not significant (equal to zero) if the $F_{statistic} > F_{table}$; otherwise, the null hypothesis is accepted. Meanwhile, the criteria for testing the linearity of the regression equation is to reject the null hypothesis that the regression equation is linear if the calculated $F_{statistic}$ for tuna matches < F_{table}; otherwise, the null hypothesis is accepted.

c) Calculating a simple correlation coefficient and testing its significance. The Correlation Product Moment formula is used to calculate a simple correlation coefficient, as follows:

$$r = \frac{n\sum XY - (\sum X)(\sum Y)}{\sqrt{\{n\sum X^2 - (\sum X)^2\}\{n(\sum Y^2 - (\sum Y)^2\}}} \quad (5)$$

d) After the price of a simple correlation coefficient is obtained, the significance test is carried out through testing the null hypothesis (H_0), which states that the correlation coefficient is not significant (equal to zero), against the counter hypothesis (H_1) that the correlation coefficient is significant (not equal to zero) using the statistical formula t-test as follows:

$$t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}} \quad (6)$$

The criterion for testing the significance of the simple correlation coefficient is that the null hypothesis is rejected if $t_{statistic} > t_{table}$; otherwise, the null hypothesis is accepted.

e) Determine the price of multiple regression $\hat{Y} = b_0 + b_1X_1 + b_2X_2$. The calculation of Y multiple linear regression analysis on X_1X_2 uses the regression equation $\hat{Y} = b_0 + b_1X_1 + b_2X_2$. To calculate the price of the coefficients b_0, b_1, and b_2 the following formula is used: $b_0 = \bar{Y} + b_1\bar{X}_1 + b_2\bar{X}_1$

$$b_1 = \frac{(\Sigma x_2^2)(\Sigma x_1 y) - (\Sigma x_1 x_2)(\Sigma x_2 y)}{(\Sigma x_1^2)(\Sigma x_2^2) - (\Sigma x_1 x_2)^2} \quad (7)$$

$$b_2 = \frac{(\Sigma x_1^2)(\Sigma x_2 y) - (\Sigma x_1 x_2)(\Sigma x_1 y)}{(\Sigma x_1^2)(\Sigma x_2^2) - (\Sigma x_1 x_2)^2} \quad (8)$$

f) Determine the significance of multiple linear regression. It is necessary to test the significance values of the multiple linear regressions obtained as a whole for Y over X_1 and Y over X_2. For this purpose, the following formula is used:

$$F = \frac{JK(R)/k}{JK(S)/(n-k-1)} \quad (9)$$

$$JK(R) = b_1 \sum x_1 y + b_2 \sum x_2 y \quad (10)$$

$$JK(S) = \sum y^2 - JK(R) \quad (11)$$

g) Determine the multiple correlation coefficient between X_1X_2 and Y. To calculate the multiple correlation coefficient between ($R_{y.1}$), the formula is used:

$$R_{y.1}^2 = \frac{JK(R)}{\sum y^2} \quad (12)$$

$$R_{y.1} = \sqrt{\frac{JK(R)}{\sum y^2}} \quad (13)$$

h) Test the significance of the multiple correlation coefficient between X_1X_2 and Y. To calculate the test of significance of the multiple correlations between X_1X_2 and Y; the following formula is used:

$$F = \frac{JK(R)/k}{JK(S)/(n-k-1)} \quad (14)$$

i) Calculate the contribution of each independent and dependent variable individually. To find out how big the contribution of the independent variables (X_1 and X_2) to the dependent variable (Y) is, determined by squaring the simple correlation coefficient X_1 to Y (r_{y1}) and X_2 to Y (r_{y2}) multiplied by 100%. The following is the formulation of each contribution; contribution of X_1 to Y = $(\rho_{y1})^2$ *x* 100% and contribution of X_2 to Y = $(\rho_{y2})^2$ *x* 100%

j) Calculate the contribution of the two independent variables to the dependent variable together. To find out how much the independent variables (X_1 and X_2) contribute together to the dependent variable (Y), determined by squaring the multiple correlation coefficient X_1X_2 to Y ($R_{y.1}$) multiplied by 100%. Here is the formula:

Contribution of X_1X_2 to Y = $(R_{y.1})^2 \; x$ 100% (15)

4 Conclusion

The Reading Literacy Activity Index for junior high school students in Purbalingga City needs special attention to the variables that are thought to have contributed or contributed to the index. In this article, the author describes the method of measuring the relationship between variables, namely the variable digital literacy skills, the School Literacy Movement, and the alibaca index for junior high school students in Purbalingga City. In summary, the steps in the method of measuring the contribution of digital literacy skills and the School Literacy Movement to the index of reading literacy activities of junior high school students in Purbalingga City consist of; making measurement designs, determining populations and samples, making research instruments, collecting data, conducting validity and reliability tests, and analyzing data.

Departing from the issue of the alibaca index in Purbalingga City, which is included in the low category, it is necessary to conduct a scientific study related to the variables that make up the alibaca index. The correlational approach is considered appropriate to find the relationship between variables that contribute to the low alibaca index in Purbalingga City. The process of collecting and analyzing data should be based on empirical data in the field so that decision-making is objective and on target. In this article, several formulas related to statistical calculations at each step in the measurement method are explained entirely and clearly. With the explanation of the measurement methods mentioned in this article, other research related to measuring the correlation between variables of digital literacy skills, the School Literacy Movement, and the alibaca index can be carried out well and smoothly so that this article can be widely helpful in the field of measuring contributions between variables.

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