

The Effects of Creativity and Student-Teacher Interaction on Scientific Literacy Skill

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Abstract. The importance of scientific literacy skill can identify scientific issues underlying national and local decisions and express positions that are scientifically and technologically informed. This study aims at describing the effects of creativity and student-teacher interaction with scientific literacy skill. This research was conducted at SMA Batik 2 Surakarta in January 2018. The method use was survey research method. Research variable are independent variables which are creativity and student-teacher interaction and dependent variable which is scientific literacy skill. The subject in this study consisted of 88 students. Data were analyzed using multiple linear regression, F test and t test. Based on the t test is known that creativity gives significant effect on the scientific literacy skill, this is evidenced by the t test showed significance level greater than 0.05 is 2.059. From t test is also known that the student-teacher interaction gives significance effect on the scientific literacy skill, this is evidenced by the t test showed significance level greater than 0.05 is 6.853. Based on the F test is known that creativity and teacher-student interaction simultaneously gives significant effect on the scientific literacy skill, this is evidenced by the F test showed significance level is greater than 0,05 is 10,552.

Keywords: Scientific Literacy Skill, Creativity, Student-Teacher Interaction

INTRODUCTION

Science and technology are key drivers of development, the impact of scientific and technological development is economic progress, improvement of health systems, education and infrastructure. Advances in science and technology have an impact on innovation that will make it easier for human beings to deal with their problems. A person who has the scientific literacy skills will be easy to solve the problem. Based on interviews with one of the tenth grade physics teachers of SMA Batik 2 Surakarta in December 2017 most of the students in solving the Physics problems follow the way as exemplified by the teacher. When the problems they face are different from the presentation they will have difficulty in solving, then the students should have creativity that makes the students can choose the right way to solve the problem.

The definition of creativity proposed by Munandar is the ability to think divergently or the idea of exploring various alternative answers to a problem, which is just as true [1]. According to Rogers, creative process is that it is the emergence in action of a novel relational product, growing out of the uniqueness of the individual on the one hand, and the material, events, people, or circumstances of his life on the other [2]. Creativity is one of the basic human needs for self-actualization which is the highest need for human beings. Maslow had mentioned the "creativity" of self actualizing people only briefly in his earlier writings on self actualization [3]. According to Rhode creativity can be defined into four dimensional types as Four P's of Creativity, ie the dimensions of Person, Process, Press and Product [4]. The definition of creativity from the person dimension as expressed by Guilford that Creativity refers to the abilities that are characteristic of creative people [5] The definition of creativity that emphasizes the process dimension

as proposed by Munandar that creativity is a process that manifest in self in fluency, in flexibility as well in the originality of thinking [6]. The definition of creativity that emphasizes the dimension of the press is stated by Amabile that creativity can be regarded as the quality of product or response judged to be creative by appropriate observes [7]. The definition of creativity from the product dimension suggested by Baron that creativity is the ability to bring something new into existence [8].

Hurlock calls the creative person a "creativity syndrome". The characteristics of the creative syndrome according to Hurlock include flexibility, disobedience, the need for autonomy, the pleasure of cultivating ideas, self-confidence, confidence, risk-taking, fondness, adventure courage and persistence develop self-chosen interests [9]. There is a difference between creative and non-creative human beings seen from their attitude and character. In accordance with the opinion of Ruseffendi who mentions the creative human trait that has a curiosity, flexible in thinking, sensitive to realis and full of confidence, unexpected, vision of the future, solve problems, not easy to accept opinions and sometimes hard to get orders [10].

The interaction of teaching and learning implies the existence of interaction activities of teachers who carry out teaching tasks and learning citizens (students / subject learning) who are carrying out learning activities [11]. Winarno Surachman defines Interaction of teaching learning as an interaction that takes place in the bond of educational objectives [12]. The purpose of teaching and learning interaction is stated in the learning objectives which is an explicit goal, the interaction of teaching and learning is directed to the activity is on the side of the students. At the time of the learning process, the teacher must understand the students with all the consequences, because the success of the interaction is more influenced by the teacher in managing the class. Teachers are the main components in the learning process, teachers deliver the subject matter to the students through the interaction done in teaching and learning process. The success of the teacher in delivering the material is highly dependent on the interaction of the student teacher. The lack of interaction leads to the message conveyed by the teacher. The learning process should be based on the principle of optimal interaction between teachers and students, students themselves, and learners with a variety of learning resources including the environment [13]. In the process of interaction between teachers and students in to learning to learn required components or elements that must be available, the components are interrelated and mutually influence each other. The teaching process is essentially a series of communication activities between students, teachers and learners. Communication between these two subjects is influenced by sharing factors including 1) Destination factors 2) Material / material factors 3) Teacher and student factors, 4) Method factors, 5) Situation factors.

Physics as a part of science has brought society to the development of technology in various fields such as education, health, industry, transportation, communication, etc. Every individual who uses his scientific skills in everyday life is called a science literacy skill. Scientific literacy is defined as the ability to engage in science-related issues, and with the ideas of science, as a reflective citizen [14]. PISA (Program for International Student Assessment) assesses students' science literacy in three competencies including identifying scientific issues, explain scientific phenomenon, and using scientific evidence. Indonesia has participated in PISA assessment from 2003 to 2015. The result of literacy score of Indonesian students in the year 2015 averaged 395. While the average score in OECD countries is 493. This shows that Indonesian students' science literacy is in the low category [15].

Teachers play an important role in the achievement of student science literacy. Teachers know and cultivate science literacy so as to solve the problems in life in the environment. This study aims to determine the influence of creativity and interaction of teachers and students to skill literacy science students SMA Batik 2 Surakarta tenth class by the year 2018.

METHODS

This research was conducted in SMA Batik 2 Surakarta in tenth grade student of year 2017/2018 which was done on January 2018. The population in this study is the students of class X MIPA SMA Batik 2 Surakarta in the even semester of the academic year 2017/2018 consisting of 3 classes as many as 110 students

Table 1. State of Population

No	Class	The number of student
1	X MIPA 1	36
2	X MIPA 2	37
3	X MIPA 3	37
Amount		110

Source: SMA Batik 2 Surakarta 2018

Sample selection was done by cluster random sampling The number of samples used in this study were 88 students. Cluster random sampling is a technique of sampling data in a random way, researchers work with physics teachers in selecting samples.

In this study, researchers used a quantitative approach, while the type of this study using descriptive correlation because this study aims to obtain a description of the variables studied and know whether there is influence between each variable. Correlation research is a study intended to determine whether there is a relationship between two or several variables [16]. The independent variables in this research are creativity (X₁) and teacher-student interaction (X₂) while the dependent variable (Y) is science literacy skill. The relationship between the variables in this study is as follows

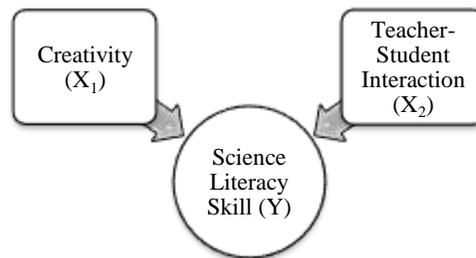


Figure 1. Relationship between variables

Instruments in this study using creativity questionnaire, teacher-student interaction questionnaire and science literacy skill test. Questionnaires in this study using the scale of Linkert with answer options strongly agree, agree, quite agree, disagree. The instrument used in obtaining data on science literacy capability is the test adopted from PISA totaling 20 items of multiple choice. Qualitative data in this study is data in the form of sentences, while the quantitative data obtained from the data processing questionnaires are converted in the form of numbers. In this research, quantitative data is ordinal data which is treated as interval data because the questionnaire used using Linkert scale. Primary data in this research is obtained from research variable that is creativity, student interaction and scientific literacy skill. Data collection techniques used questionnaire and test methods. The determination of creativity score category, teacher-student interaction and scientific literacy skill is based on calculation of score in table 2.

Table 2. Skill Category Scale

Average score of answers	Classification
81 – 100	Very good
61 – 80	Good
41 – 60	Enough
21 – 40	Less
0 – 20	Very less

This study uses descriptive statistics to describe about creativity, teacher-student interaction and science literacy skills of physics subjects. Then use multiple linear regression to find the partial influence between creativity (X₁) and teacher-student interaction (X₂) as independent variable with science literacy skill as dependent variable (Y).

In the regression analysis there are several assumptions that must be passed so that the resulting regression equation will be valid if used to draw conclusions. In this study used the normality test. Hypothesis test in this research use t test that function to know the existence of influence of independent variable of creativity (X₁) and teacher-student interaction (X₂) to dependent variable that is scientific literacy skill (Y). To get accurate data then research using SPSS program for Windows version 17

RESULTS AND DISCUSSION

After the research conducted on the respondents as many as 88 students of the tenth grade of SMA Batik 2 Surakarta obtained the data value of students' creativity scale, the value of teacher-student interaction scale and the value of literacy science skills test. All data are presented in the table for analysis. Description of creativity, teacher and student interaction and science literacy skills. The average score of Creativity on students is 67.8 is in the good category. The average score of teacher and student interaction is 75.2 is in the best category. The average score of literacy science skills is 56.8 are in enough categories. Before the analysis, the data were tested first using the normality test. The results obtained by the data used in this study are normally distributed. So we can use the regression equation.

Table 3. Summary of Multiple Linear Regression Test Results

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	-34.103	8.117		-4.201	.000
Creativity (X1)	.598	.192	.426	3.117	.002
STI (X2)	.707	.229	.422	3.088	.003
Dependent Variable : SLS (Y)					
R square : 0,681					
Adjust R Square : 0,673					

Based on the result of multiple linear regression analysis, the constant value of -34,103, while the value for creativity variable (X1) is 0,598, teacher-student interaction (X2) 0,707. When included in the original regression function the following equation is obtained:

$$Y = -34,103 + 0,598 X_1 + 0,707 X_2 + e$$

Regression equation can be interpreted with the increase of student creativity of one unit then the scientific literacy skill will increase by 0,598 assuming other variable is fixed value and increase of teacher-student interaction by one unit hence scientific literacy skill will increase equal to 0,707 with assumption other variable have value fixed .

The value of coefficient of determination (Adjusted R Square) of 0.673. This means that 67.3% of the variables change in science literacy skills are due to teacher-student creativity and interaction. While the remaining 32.7% is caused by other factors.

Table 4. Effect of Teacher-Student Creativity and Interaction Partially on Science Literacy Skills

Independent variable	Sig	Information
Creativity	0,02	Ho Rejected
Teacher-Student Interaction	0,03	Ho Rejected

Based on Table 4 it is known that creativity has a significance value of $t \ 0.02 < 0.05$. So there is a significant positive influence of creativity variables on the scientific literacy skill. In Table 2 it is also known that Teacher-Student Interaction has a significance value of $t \ 0.03 < 0.05$. So there is a significant positive influence of teacher-student interaction variables on the scientific literacy skill

Table 5. Effective Contribution Results

Independent variable	Standardized Coefficients	Zero-order	Count
	Beta		Zero-order x Beta
Creativity	0,426	0,803	$0,426 \times 0,803 = 0,342$
Teacher-Student Interaction	0,422	0,803	$0,422 \times 0,803 = 0,339$
Total			0,681

From table 5 it can be seen that the dominant independent variables effect on student learning outcomes is creativity variable that is equal to 34.2%

Descriptions of the creativity variables in the students show that most students agree on the statements that have been given. The majority of respondents answered on twenty-three out of thirty-five questions. In addition, the average score of respondents' answers from thirty-five item statements is 67.7. It can be concluded that student creativity is good.

A description of the teacher-student interaction variable data indicates that students agree on nineteen out of twenty-five items. The average score of respondents' answers to the twenty-five question items is 75.3. It can be concluded that teacher-student interaction is good. Descriptions of the scientific literacy skill variables in the study were 36 students (41%) had high classification, 43 students (49%) of medium classification and 9 students (10%) of low classification so the scientific literacy skill was sufficiently evidenced by the average score was 56,8.

The result of data analysis also shows that there is a significant positive effect of creativity variable on the scientific literacy skill. This means that high student creativity will create high scientific literacy skill of student.

CONCLUSION

The results of this study indicate that: (1) The creativity of SMA Batik 2 Surakarta students in the tenth grade class year 2017/2018 is 67.7, teacher-student interaction is 75.3, and students' science literacy ability is 56.8 (2) there is a significant positive influence between creativity the ability of science literacy (3) there is a significant positive influence between teacher-student interaction on the scientific literacy skill (4) creativity is the dominant variable affecting the scientific literacy skill.

Based on the results of this study, researchers suggest: (1) for teachers to improve teacher-student creativity and interaction (2) for students expected to be more active in learning activities so as to improve science literacy skills (3) for parents should provide guidance when children have difficulty in learning and give encouragement to be more active in learning (4) for researchers interested in this research can do further research on factors influencing scientific literacy skill such as motivation, interest, learning environment and learning facility.

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