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Student Difficulties Based on Literacy Skills and Interpreting Social Problems or Mathematical Data Using Graphs

Citra Fertika Putri[1],Sugeng Sutiarso[2], Budi Koestoro[3]
[1,2,3]Lampung University, INDONESIA
Corresponding Author: Citra Fertika Putri1

Abstract: *This study aims to determine the ability of students in the ability literacy and interpret the graphs and data from an environmental event in everyday life. The study was conducted in state junior high school 1 of Braja Selebah. The number of students who become the sample of research is 25 people who are sitting in Class 8, the class 8A. The research instrument uses Test of Graphing in Science (TOGS). In reading and interpreting the graphs and data the students have average percentages below 50% for correct answers and the Minimum Criteria Completion (KKM) in Class 8A is 3.5% complete, and 96.5% remedial. From the results of TOGS diagnostic test tests that students can not read the chart well and found that students have difficulty in interpreting graphs and data. This problem is caused by the lack of students' knowledge, explanation and practical activities of the teacher regarding the presentation of graphs and data.*

Key Words: *literacy, interpretation, data, graphics, TOGS*

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I. Introduction

"Literacy for All," is a slogan echoed by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) - an international organization engaged in education. This slogan affirms the right of every human being to be "literate" as a capital to welcome life. Literacy makes individuals, families, and communities powerless to improve their quality of life. Furthermore, literacy has a multiplier effect, namely eradicating poverty, reducing child mortality, curbing population growth, achieving gender equality and ensuring sustainable development, peace and democracy (Unesco, 2014).

The presentation of graphs, diagrams, data tables, symbols, maps, and models is found in many textbooks, articles, journals, and scientific magazines. Research with the type of transformation is a manifestation in visualizing the concept to another format or model (Latour, 1987). The presentation of graphs, data tables, symbols, maps and diagrams carries information, organizes data, shows relationships patterns, and communicates scientific knowledge. Learning about science shows that knowledge of science and application in life is built through the manipulation of various forms of presentation (Knorr-Cetina, 1983; Lynch & Woolgar, 1990).

This form of presentation in scientific research not only displays different formats, but can develop, re-create the meaning of given information that can not be realized (Lemke, 1998). Many scientists demonstrate in various graphical and table research presentations, they create and connect to express ideas, interpret meanings, explain phenomena, make predictions, and use in communicating (Kozma, Chin, Russell, & Marx, 2000).

Various ways of presenting such graphs, diagrams, data tables, and models are often said to be practical studies in learning. The research making activity is a fundamental element of learning as set forth in the National Research Council standard (NRC), 1996) and is considered an important learning practice for the development of scientific literacy (AAAS], 1989, 1993). Knowledge of graphical interpretation and data in the field of science and science learning is essential for students to have this competency. However, many elementary, middle-to-senior students still have difficulties in using, interpreting, and understanding graphs and data (Ben-Zvi, Eylon, & Silberstein, 1987; Krajcik, 1991; Leinhardt, Zaslavsky, & Stein, 1990).

Student competence in graphic and data interpretation has become an important part of mathematics and science learning. The study of the development of graphical representation has been widely used in scientific research, including in the field of physics studies (A. Van Heuvelen and X. Zou 2001, Ambelu et al., 2011), Mathematics, Chemistry (Kozma And Russell, 1997), and fields others.

Junior high school students begin to learn about the complexity of science through science learning materials. Learning from the environment is a manifestation of the science-learning strategy as dictated by the National Education Act (2003), the National Research Council [NRC] (1996), and the American Association for the Advancement of Science [AAAS] (1989, 1993) emphasize the importance of learning science Based on the development of environmental knowledge skills.

The research activities focused on the ability of graphical interpretation and data on junior high school students through the Test Of Graphing in Science (TOGS) diagnostic test. Through this research, several questions that limit the problem in this activity include 2 parts, namely:
1. How do students read graphs and data from an event?
2. How do students interpret graphs and data from an event?

II. Understanding Concepts

The theory that explains the understanding in learning as stated in Blomm (1971, 149- 157) that understanding is the second level of the cognitive domain. Cognitive domain second or often written with conceptual understanding. Understanding the concept means an aspect that refers to the ability to understand and understand a concept and interpret the meaning of a material. The ability of students in interpreting from a concept can by reflecting from the expression of students through words, writing, response in explaining back through his own language.

According to Blomm there are three aspects to this domain, namely translation, interpretation, and extrapolation. Translation is defined as the ability of a person to change or translate a communication into another language or into another term, or into another form. The ability of translation as in the concept of straight-motion kinematics can be categorized to the ability of the party to change the motion of one representation into another, or from a statement to another. However, the changes are still equivalent and do not alter the data or representations presented earlier. One of the abilities of translation as expressed by Blomm is the translation of the symbolic form to another or vice versa. The symbolic shapes in question include maps, tables, diagrams, graphs, mathematical equations and visualizations, so the ability to translate from symbolic forms into verbal forms is part of this category.

With broader explanations, the abilities included in Blomm's symbolic translation categories (1971, 151) include: (1) the ability to transform or translate geometric concepts verbally given into pictures or terminology of space and vice versa, (2) Ability to graph the symptom, or from the observed or recorded data, (3) the ability to read numerals which in physics are expressed in terms of quantities, units and constants, and (4) the ability to read images or read diagrams. Interpretation is literally interpreted by interpretation or interpretation, broadly interpretation is the ability to interpret from a form of representation. Interpretation relates to the communication representation of an idea configuration, which may require a retrieval of the idea into a new configuration of interpreter thinking.

In interpreting a representation, a person first translates any parts of the representation that are still general in nature so as to facilitate the interpretation of representations, or by converting one form of representation to another. Intrepretation also includes the ability to recognize essences and differentiate them from less essential or less important aspects of the communicated information.

Behavior in interpreting is that students can identify and understand the main ideas contained in the information presented, and understand the relationship between ideas or ideas. In terms of Physics learning, interpretation includes:
1. Ability to interpret verbal statements
2. Ability to interpret images, interpret graphs, diagrams, and mathematical equations
3. Traffic interprets various data types
4. Ability to make proper qualifications in interpreting data
5. The ability to distinguish between or contradictory conclusions from the data arrangement.

While extrapolation is the ability to forecast or estimate. The ability of understanding of extrapolation types is based on translation and interpretation skills, so that the ability of extrapolation leads to mastery of translation and interpretation skills. A similar capability similar to extrapolation is intrapolation.

The official inclusion of the teaching of graphing in school curricula has motivated increasing research and innovative pedagogical strategies such as the use of media graphs in school contexts (Carlos & Janet, 2007). Diagrams or charts by Somantri (2006: 107) are images that show data visually, based on their original observational values or from previously created tables. Meanwhile, according to Sudijono (2008: 61) graph is a statistical presentation tool contained in the form of paintings, either painting lines, painting pictures, and symbols. And according Riduwan (2003: 83) diagram is a picture to show or explain something data to be presented.So a graph or a diagram is a statistical data presentation tool in the form of painting either painting lines, pictures or symbols.

III. Method

To find out the students' ability to understand social problems or mathematical data covering and interpreting of life events, the authors use natural natural methods (Lincoln & Guba, 1985, Moschkovich & Brenner, 2000) from daily life events. This study uses qualitative methods, the authors attacked several aspects of science literacy skills are aspects of cognitive and aspects of science applications. These two aspects are combined and interconnected, so the authors get reviews for the interests and abilities of students.

The instrument of this study used a diagnostic test from the Graphing In Science Test (TOGS) (McKenzie, D. L., & Padilla, M. J., 1986). TOGS is used to invite reading and interpreting students from. This research activity was conducted for 2 meetings at state junior high school 1 Braja Selebah in grade 8A, with total sample of 25 students.

IV. Results and Discussion

To answer the research question, several stages of analysis are taken. The first stage, the authors looked at the TOGS diagnostic test results from the students who then captured the average of each item of ability in Table 1.

The second stage is the response statement from the questionnaire given to the students. To identify the problem analysis on TOGS, the following item item analysis includes student ability, definition, and number of questions.

Tabel 1. Problem analysis

Ability	Definition	Item Problem
Identify charts from data	Develop data in graphic form	13, 14, 15
Determine the data of independent variables and dependent variables into the graph	Selection of free variable data and dependent variable in graphic form	9, 8
Specifies the data value of the variable range	Selection of values from variable data range	3
Specifies the variable names in the coordinates (X, Y)	Mention variable names in coordinates (X, Y)	12, 6, 7
Determine the data (X, Y) on the graph	Data on the x and y axes shown by graph	1
Studying the virgin between the two measurement data on the graph	Interpolation on graphs	2, 11
Specifies the extrapolation of the measurement data on the graph	Extrapolation on graph	4, 5
Determine the relationship between variables on the graph	Relation of independent variable with dependent variable	10

For some items the ability of students has difficulty to understand as in the item: Identify the graph of the data and determine the free variable data and the dependent variable into the graph that both have average percentages below 50%. Similarly, the ability to predict data has a percentage of 17% for the correct answer. This shows that students have difficulties in identifying charts from data tables and determining data from independent variables and dependent variables which are then presented in graphical form as well as predicting data between two ranges of data (interpolation). Students who achieve the Minimum Criterion Score (KKM) score of 3.5% complete, and 96.5% remedial. So it can be seen that students have difficulty in reading and interpreting social problems or mathematical data in the graph.

Student Questionnaire Descriptions Some student difficulties in understanding social problems or mathematical data in graphical form are also mentioned in the distributed questionnaire. Some students responded to difficulties and did not understand about graphs and tables as shown in the Table 2 and 3. So for these conditions, students do not easily solve the graph problem. The author tries to find the cause of the student's problem through a statement from the questionnaire. Is it because students do not get knowledge from the teacher.

Table 2. Speech of students to the questionnaire statement

Statement	Response	Reason
I am very good at reading data tables and graphs	Disagree (TS)	Wi: I do not understand about graphics In: I'm having trouble understanding the graph Er: I do not understand in reading tables and graphs Dw: Because hard to learn let alone read Ka: I am sometimes confused En: Lack of understanding how to read the table.

Tabel 3. The student's response to the questionnaire statement

Statement	**Response**	**Reason**
In the learning activities of Mathematics teacher give explanation about data and graph from environment	Disagree (TS)	Na: Rarely explain the graph Ba: Rarely gives an explanation in graphical form Ci: Teachers often give material with lectures

Students are not well received explanations of data and graphic presentation in learning activities, even in Ci that teachers are more likely to provide materials with lectures.

V. Conclusion

From the analysis results of the TOGS diagnostic test and show that:

1. Students have difficulty in reading the graph, this is indicated from the TOGS test where the test results have the achievement of true answer less than 50%.
2. Students can not interpret graphs and data. The same is shown from the TOGS test that the average student does not understand the relationship between variables in the data and graph.

This is supported by questionnaires distributed to students, that students have difficulty in reading, understanding and graphs and data. This problem is caused by the lack of students' knowledge, explanation and practical activities of the teacher regarding the presentation of graphs and data.

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