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Onto Semiotic Approach Profileof Senior High School Student Based on Cognitive Style in Solving Statistics Problem

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ABSTRACT

This paper was exploratory research, with the aim to describe the Onto-Semiotic Approach (OSA) profile of Senior High School students who have of Field Dependent (FD) and Field Independent (FI) cognitive style in solving statistics Problem. Aspects an OSA used in this study are the language, concepts, computational, procedures, arguments and propositions in a matter of statistics. Selection of subjects using GEFT tests to determine students' FI and FD cognitive style. The data collection technique used was a task based interviews. The data obtained were analyzed qualitatively based on aspects of OSA. Finally, purpose of this paper was to describe the theory about differences OSA in the characteristic of students FI and FD cognitive style in solving statistics problem.

Keywords: *Onto-Semiotic Approach, statistics, Field Dependent, Field Independent*

INTRODUCTION

Students are difficult to distinguish the symbols and concepts of statistics (Septi, 2015). As in calculating the average, students showed symbol μ , then change to x, but subsequently did not know what to do. In addition, students are also not able to distinguish the symbol sample population. The ability of students calculate the mean and median are not problematic but had trouble when it understands that the mean and median are used to determine the data center. The student shows that he is able to apply the rules he learned, but cannot expand the conceptual rules. So it can be said that students have difficulty in connecting practice for conceptual reasoning.

From the description to note the meaning of mathematical objects both in studying mathematics and solves mathematical problems, for the purpose of learning achieved. The meaning of mathematical objects for mathematics education should be emphasized Balacheff (1990). Sierpinska (1994) emphasized the close relationship between the notions of meaning and understanding.

Several studies in the Mathematics Education who studies the semiotic system approach (eg, Duval, 2002,

2006; Bosch &Chevallard, 1999; Steinbring, 2005, 2006; Radford, 2003a; Arzarello& Edwards, 2005). The study deepens opinion as Peirce, Frege, Saussurre ,Vygotsky and others in semiotics.

Semiotic signs include visual and verbal form code system that systematically submits written information in every human activity. The study of the relationship between the representation of the symbol and representation of symbols and concepts are at the heart of semiotics. Eco (1976) uses the term "semiotic function" to describe the relationship between the text and the components and between the components. Semiotic function connects the antecedent and consequent mark (Noth, 1995). Semiotics is referred to in this study is an expression of mathematical objects are presented with icons, symbols and statements in mathematics.

Godino (2000) tried to progress in developing a specific ontology and semiotics to study the process of interpreting the mathematical sign systems used in didactic mathematics. Here, the meaning is interpreted in terms of practice-related system objects. The theoretical was constructed as Onto-Semiotic Approach (OSA).OSA

is defined in this study is an expression of mathematical objects that language, concepts, procedures, computing, arguments and propositions.

Cook, Samuel A (2013) stated that students in general, can calculate the mean, median and mode, but they just remember that a little beyond that. Finally, students have difficulty connecting procedure for meaning. Ardana (2007) states that everyone has the specific ways in the act, expressed through the activities of perceptual and intellectual consistently. Perceptual and intellectual aspects revealed that each individual has a different characteristic with another individual. In accordance with a review of that aspect, noted that individual differences can be expressed by the types of cognitive, known as cognitive style.

In this study, cognitive style divided into two cognitive style field dependent (FD) and field independent (FD). Classification of cognitive style cognitive style into a FD and FI is based on differences in the psychological aspect. Individuals who receive something more global and difficult to separate themselves from the surrounding circumstances or background influenced more by the circumstances surrounding the so-called field dependent individuals. While individuals who tend to express something off the picture of the background of the picture, as well as being able to distinguish objects from the surrounding context and looked at the surrounding context is more analytically-called individual FI In this paper, we will describe the Onto-Semiotic Approach (OSA) profile of high school students who have the FI and FD cognitive style in solving statistics.

METHODS

This paper is a descriptive research which tries to describe Onto-Semiotic Approach (OSA) profile Senior High Students in solving the statistic problem. Subject of this research was two senior high student with FIand FD cognitive style at SMA Muhammadiyah 4 Surabaya in academic year 2015-2016. The instrument used was a matter of testing and interview guides. Data collection techniques used was test and interview. To test the validity of the data used to time triangulation. Data were analyzed, and then inferred based on OSA aspects is language, concepts, computing, procedure, argument and preposition in statistic material. Procedures of this research are as the following:

1. Choosing of research subject with used GEFT test to determine subject with FI and FD cognitive style. So

choose two studentswhich have FI and FD cognitive style with similar mathematics ability.
2. The data collection technique applied was assignment based interview which analyze the students' solving statistic problem with the descriptive-qualitative method. Choose some students to be interviewed about OSA Profiles.The following types of mathematical objects, introduced in the OSA to describe the mathematical practices, are identified,
   a. Language: terms, expressions, symbols, graphs used to represent the statistics and The precision and accuracy of the language used by the structure of the vocabulary of mathematics
   b. Concepts*:* Abstract ideas in statistics and The accuracy of the use of concepts in statistics
   c. Procedures: The steps used in solving statistics
   d. Computing: the accuracy of the formula in statistics and the accuracy of the calculations in statistics
   e. Arguments: used statement explaining the truth of the answers in statistics and the accuracy of the arguments presented in the statistics
   f. Propositions: the principle of which consists of several facts , concepts are linked by a relation or operation in statistics
3. Writing the research report Instruments of this research are a solving the statistic problem and the interview guidelines.
4. The task of statistic problem is "Make as 15 Value Data, with mean and median are 6 And the modus are 5 and 6!".
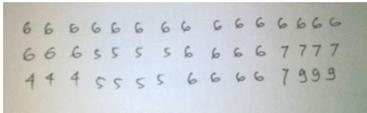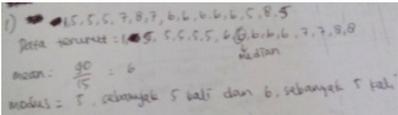
RESULT AND DISCUSSION

Table 1 is description of OSA profile for FI and FD subjects in solving the problem of statistics based on task-based interviews.

CONCLUSION

The conclusion of this study is
1. Onto-Semiotic Approach (OSA) profile of Senior High School students who have of FI cognitive style in solving statistics is the language is used consistently and correctly, the concept is the size of a single data centralization, procedure is wrote the number 6 by 6 by 15, determine the data to 8 worth 6, determine data whose value 6 and 5 should be the

Table 1. Description of OSA Aspects

Aspects OSA	FI Subject	FD Subject
Language	Data, mean, median and mode, number, odd, the smallest and the largest.	Data , mean, median , mode , numbers, odd , smallest , largest , average , value , and lowest
Concepts	the size of a single data centralization	single data
Procedures	1. Wrote the number 6 by 6 by 15 , 2. Determine the data to 8 worth 6 3. Determine data whose value 6 and 5 should be the same , and more appear than any other value 4. Search for many values of 5, 6 and another by trial and error. 	1. Using the formula for determining the amount of the mean value 2. Write down the numbers 5 and 6 (for the mode 5 and 6) 3. Determine the median is 5 4. Experimenting write down the value that is other than 5 and 6
Computing	The use of the formula does not seem	Used to mean formulas
Arguments	1. Wrote the number 6 as many as 15 on the grounds that his mean the 6 and number 15 , so that the amount of value should be 90 2. Determine the median is the data to be worth - 8 6. - 8 data to the reason Since the middle of the data is the data to 15 to 15 3. Determine the mode by writing the numbers 5 and 6 more than other numbers 4. Write down the numbers 5 and 6 by 4 by reason of trial and error 5. Write down the numbers other than the numbers 5 and 6 to try because of the amount of the overall value of 90 6. Write down the lowest value and the highest 4 9 by trial and error	1. Using the formula for determining the amount of the mean value , the reason for the formula 2. Write down the numbers 5 and 6 (for the mode 5 and 6) as much as 5 times (analogy) 3. Determine the median is 5 , because it is known 4. Experimenting write down the value that is other than 5 and 6 , because the value of the other unknown
Propositions	1. Data can be made if known the mean, median and mode. But not only the exact data for forecast data. 2. To check the back can be used formulas mean, median and mode of single data , if in accordance with the known , the data are made correctly . 3. To determine the mode and median data must be sorted 4. The mode of a single set of data can be more than one.	looking for a median of data must be sorted

same, and more appear than any other value, search for many values of 5, 6 and another by trial and error, computing is used correctly , and does not appear using the formula, argument submitted correct and logical, and propositions made vary and correct

2. Onto-Semiotic Approach (OSA) profile of Senior High School students who have of FD cognitive style in solving statistics is the language is used consistently and correctly, the concept is single data, procedure is using the formula for determining the amount of the mean value, Write down the numbers 5 and 6 (for the mode 5 and 6), determine the median is 5, experimenting write down the value that is other than 5 and 6, computing using the mean and true formula, argument submitted a brief and true, propositions made only one and true.

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