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MATHEMATICS SELF-CONCEPT AND ANXIETY WITH DIFFERENT ACHIEVEMENT IN CALCULUS PROBLEM SOLVING

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Abstract

The objective of this study was to describe mathematics self-concept and anxiety of twelfth grade students according to their mathematics achievement preferences. There were a total of 3 students involved in this study. In the collection of data , the researcher employed three types of instruments: mathematics test, Mathematics Self-Concept Scale (MSC) and Test Anxiety Inventory (TAI). Mathematics test determined the participants' achievement preference: high, standard and low achievement. The MSC found the participants' mathematics self-concept. The TAI found the participants' mathematics anxiety. The study revealed that students who had high achievement in mathematics would try to accomplish test in any level of difficulty and tried to accomplish any form of test. These students had no worry or fear in facing mathematics test. Meanwhile, students who had standard achievement in mathematics would try to accomplish test in standard and low level of difficulty and tried to accomplish the test. These students felt nervous but could focus their mind and had no physical characteristics in facing mathematics test. Moreover, students who had low achievement would try to accomplish low level of test. These students felt nervous, unsteadiness and could not focus their mind but had no physical characteristics in facing mathematics test.

Key words: mathematics self-concept, mathematics anxiety, mathematics achievement, problem solving

INTRODUCTION

Background

Many researchs have been done to investigate student attitude toward mathematics. Some of them show that students who have negative attitude toward mathematics tend to have lower learning outcomes. Slavin (2006), elementary school students who have low mathematics achievement tend to have low negative attitude toward mathematics and have high risk in mathematics achievement when they are in the secondary and high school.

Indonesian language dictionary put down definition about attitude as an act based on conviction. Meanwhile, Oxford Advanced Learner Dictionary states that attitude comes from Italy language that is attitudine that has meaning as manner of placing or howithlding the body, way of feeling, thinking or behaving. The definition explained by Allport (in Djaali, 2009), attitude is a mental and nerve readiness based on experiences then influence and change action chosen. This case relevant with bandura social theory that thought and feel about him/her will influence his action ,specially when they posture a problem.

Based on the short explanation above, psychologists try to investigate about students and their mind. There are many psychology term used to show various aspect in student attitudes such as self-concept and anxiety. These attitudes should influence students in doing activities in daily life.

Djaali (2009), self-concept is an image constructed by a certain person about him/herself and it is not an ideal image in the same manner as he/she hopes. Moreover, Slameto (2010), anxiety is a temporary emotional condition in human feelings followed by uneasy and nervous consciously and subjectively.

Many researchs have been done to investigate correlation between self-concept, anxiety and learning outcomes. One of them is research investigated by Sukawati (2008) who state that there is a significant result between mathematics self-concept and mathematics anxiety toward mathematics achievement. Eggen (2013), self-concept become more realistic as interactions with others give students more accurate measures of their performance compared to their peers. Furthermore, Slameto (2010), correlation studies show there is a significant correlation among student achievement and self-concept. The researchs conducted by Sarason prove that students with high anxiety have no great achievement as well as students with low anxiety (Slameto, 2010).

Many method have been developed to achieve teaching objectives in mathematics teaching. One of objectives in mathematics formulated by National Council of Teachers of Mathematics is problem solving that consist of understanding problem, designing mathematics model, solving the model and interpreting solution from the model. Sukawati (2008), student's belief about difficultness in mathematics can increase anxiety in solving mathematics problem. This belief must be solved seriously since it has influenced students' attitude toward mathematics.

An emotional condition such as anxiety influence self-concept. Moreover, level of anxiety can be effected by the consciousness of achievement. Research conducted by Sukawati (2008) showed a significant correlation among self-concept and anxiety. To add the information, an experience in solving the problem is one of important sources that influence the self-concept. Besides, it can reduce anxious feeling since the experience can be a knowledge to facing the problem.

To sum up, attitudes such as self-concept and anxiety have an impact toward mathematics achievement. Students who have negative attitude tend to have low mathematics achievement (Rusgianto, 2006). Moreover, researcher try to investigate a problem about mathematics self-concept and anxiety with different achievement at twelfth grade students in calculus problem solving

Research questions

Based on the background above, research questions in the research as follows:

1. How is student self-concept and anxiety with high mathematics achievement in calculus problem solving?
2. How is student self-concept and anxiety with medium mathematics achievement in calculus problem solving?
3. How is student self-concept and anxiety with low mathematics achievement in calculus problem solving?

Research Objectives

Based on the research questions above, research objectives in the research as follows:

1. Describing student self-concept and anxiety with high mathematics achievement in calculus problem solving.
2. Describing student self-concept and anxiety with medium mathematics achievement in calculus problem solving.
3. Describing student self-concept and anxiety with low. mathematics achievement in calculus problem solving.

Research Benefits

Researcher hopes that result of the research contribute some benefits such as:

1. Development of science, the result can contribute information and science as theoretical study, especially student self-concept and anxiety in calculus problem solving.
2. School, the result can contribute an suggestion in mathematics teaching by using attitudes such as self-concept and anxiety in calculus problem solving.
3. Other researchers, the result can contribute inspiration to investigate other research about self-concept and anxiety in solving calculus problem.

RESEARCH METHOD

Design of the research

This research use qualitative research that describe self-concept and anxiety in calculus problem solving with different achievement. The researcher uses algebra questions, questionnaires and interview to investigate the description.

Subject of the research

Subject of the research is students in SMP Labschool UNESA. Selection of the research subject is based on psychology such as mathematics anxiety started since they were in elemenatary school, but to smooth the researcher communicate with the research subject, the researcher decide to choose senior high school student to be used as an research subject.

Instrument of the research

Researcher is a main instrument in qualitative research. Furthermore, this research conduct process and result. Moreover, researcher do the research immediately to all process. Besides, there are other instruments such as:

a. Mathematics achievement instrument
   This instrument is used to investigate student mathematics achievement. The instrument consist of ten questions based on UAN test since the questions have been validated nationally. After the instrument is compiled orderly, it is given to the competent validator to be validated.
b. Test of problem solving
   This instrument is made to describe self-concept and anxiety with different achievement. The instrument consist of three questions developed by researcher then consulted by two validators.
c. Self-concept instrument
   Self-concept instrument used in the research is Mathematics Self-Concept Scale (MSC) developed by Georgey (1984). The instrument consists of 27 items to assess the mathematics self-concept.
d. Anxiety instrument
   Anxiety instrument used in the research is Test Attitude Inventory (TAI) or widely known as Test Anxiety Inventory. The instrument consist of 20 items calculated by Likert Scale.

Data Analysis Technique

Researcher uses data analysis technique based on step of qualitative data analysis according to Miles and Huberman as follows:

a. Data reduction
   Reduction of the research is a selection process by simplifying datum got in the research.
b. Data display
   Display of the research is writing the data orderly to help the researcher in understanding

the data.

c. Conclusion
   Conclusion is conducted with conclude the data about self-concept and anxiety algebra problem solving with different mathematics achievement.

RESULT AND DISCUSSION

Based on the result of the questionnaires, interview and observation, researcher can invent attitudes such as self-concept and anxiety

High achievement student	Medium achievement student	Low achievement student
Student feels confident that he can do all calculus problem correctly	Student feels confident that he can do medium and easy calculus problem correctly	Student feels confident that he can not do all calculus problem correctly
Student has no psychology problem in solving calculus problem	Student feels tense in solving difficult calculus problem	Student feels tense in solving difficult and medium calculus problem
Student has no psysiology problem in solving calculus problem	Student feels that his heart beat harder when he try to do difficult calculus problem	Student feels that his heart beat harder when he try to do medium calculus problem

Discussion

1. High achievement student
   Student who has high achievement shows characteristics of self-concept dimention that is he feels confident that he can do all calculus problem correctly. Moreover, he also show characteristics of anxiety components namely Student has no psychology and psysiology problem in solving calculus problem.

2. Medium achievement student
   Student who has medium achievement shows characteristics of self-concept dimention that is he feels confident that he can do medium and easy calculus problem correctly. Moreover, he also show characteristics of anxiety components namely he feels tense and his heart beat harder when he try to do difficult calculus problem.

3. Low achievement student
   Student who has low achievement shows characteristics of self-concept dimention that is he feels confident that he can not do all calculus problem correctly. Moreover, he also show characteristics of anxiety components namely he feels tense in solving difficult and medium calculus problem and he feels that his heart beat harder when he try to do medium calculus problem.

CONCLUSION AND SUGGESTION

Conclusion

1. Student who has high score in mathematics has no problem in solving calculus problem. He feels confident in solving all calculus problem since he has positive self-concept. Furthermore, there is no anxiety characteristics when he is solving calculus problem.

2. Student who has medium score in mathematics has negative self-concept in solving difficult calculus problem. In addition, he feels tense and his heart beat harder when he try to do difficult calculus problem.
3. Student who has low score in mathematics has negative self-concept in solving calculus problem since he can not solve all calculus problem. Moreover, he also show characteristics of anxiety components namely he feels tense in solving difficult and medium calculus problem and he feels that his heart beat harder when he try to do medium calculus problem.

Suggestion

Based on the result of the research, researcher suggests the suggestion as follows:

1. Teacher should give easier questions before the difficult ones to reduce mathematics anxiety in order to students can feel confident in solving calculus problem.
2. Teacher should train students with various questions to increase their mathematics achievement.
3. Teacher should teach mathematics comfortably in order to students have no tension and nervous in learning mathematics.

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