

CHAPTER V

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

From the analysis result and the discussion on the research findings, it can be concluded as following:

1. The learning obstacles experienced by students in the learning of Pythagorean theorem are as follow:
 - a. The students tend to use the quick way to solve the problems without adequate understanding of the concept. This way directs students to use no problem solving at all and difficult to communicate their idea to the context of the problems. The students often use terms to memorize the concept that lead students to misconception and verbalism, like: 'the sloping slide' 'the sum of' 'positive sign' and others. Students tend to remember the term alone without further explanation regarding the concept. The students often memorize the concept but without lack of understanding, so that students did not do well in the problems with different context.
 - b. The students tend to fail in doing the problems with implicit information and the problem that requires visual representation in the process of solving the problem, this occurs because students usually work with the problem with explicit information and presented picture. It is also because of the lack of students' understanding and geometry ability; students often make mistakes in doing visual representation, this leads students to incorrect answer. Based on the interview results, the students do not like the word problems or a problem with long questions. The students thought that this kind of problem will lead to complicated and long answers, so students tend not to answer the problems even before read the problem first.
 - c. Ontogenic obstacles, didactical obstacles and epistemological obstacles are found in the students' answer of the given problems.

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ANALYSIS OF STUDENTS' LEARNING OBSTACLES ON THE SUBJECT OF PYTHAGOREAN THEOREM

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This happened mostly because students forget easily the concept taught before and also the lack of prerequisites knowledge that make students difficult in doing problems with mathematical connection. Ontogenic obstacles occurred in the problem solving that needs algebraic thinking, didactical obstacles occurred because the using of term and quick solution that lead students to memorize alone. The epistemological obstacles occurred in the problems that need mathematical connection and implicit information. This research indicates that the most common learning obstacles found within students is epistemological obstacles, which supposedly caused by the less of flexibility in doing problems and the meaningless learning, that it also can be caused by the didactical obstacles.

- d. Three of four students that had none of the three obstacles are from the high achievement students from each school that completed their answer correctly, eventhough there was mistake, it was only an error in calculating, while another student was the one who only wrote down the question in the answer.
 - e. There are 31 students that have all of those obstacles in their answers, seven students from the low cluster school, 9 students from the moderate cluster school and 15 students from the high cluster school. The students are from different levels of knowledge, but mostly they are from the low and the high achievement. The reason to this might be because high achievement students tend to solve the problem with their own way such as comparison or analogy but did not pay attention to the rule, while the low achievement students tend to fail in memorizing the formulas.
2. From the analysis result and extraction of mathematics textbooks, it is needed a didactical design that involves students actively in the learning process, such as discovery, reconstruction and work in varied problems. The instructional material design that is made based on the didactical

design research are shown in the attachment 47 up to attachment 51 and described on page 84.

5.2 Recommendation

From the research that has been carried out and the analysis obtained, it can be presented recommendation as follow:

5.2.1 Recommendation For Instructional Design

Based on the learning obstacles occurred within the students, instructional that actively involve students in discovering the concept is needed. The instructional design need anticipation of obstacles that might appear in the learning process, so that it can be prepared the feedback and the properties that can minimize or eliminate the obstacles. It will be better if in each situation, the approach used is regarding to eliminate those obstacles; also each meeting, there should be a situation where students are given interesting activities in order to make students grow attached and always look forward to the next meeting of learning mathematics. The design should bridge the learning process and overcome the gaps between the existing knowledge and the new knowledge so students have better learning experiences

5.2.2 Recommendation For Advanced Research

There are aspects that still need further research in this research, however because of the limited time and other reasons those aspects can be brought up in this research, such as implementation of the instructional material design. Therefore, there is wide opportunity for advanced researchers to examine the topics of mathematical matters and examine the design of the instructional materials in this research to the class, that obtained feedbacks in hoping would gain a new innovation of better mathematics learning.