

Indonesian High Scholar Difficulties In Learning Mathematics

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Abstract: This study aims to determine the difficulties experienced by students and teachers in learning mathematics. The research method used is an analytical descriptive. The instrument consists of the test, scale students opinion, and interview guides. The subjects of the study were 63 students and eight math teachers at one high school in Cimahi-Indonesia. Teachers tend to dominate learning activities. Students tend to be silent when asked to ask questions of teachers; and students' ability to think, think critically and creativity are still not well developed. The lesson plan is arranged in one semester so that the learning model that has been designed is not done because the condition of the students in the classroom is different from the lesson plan. Solid school schedules make lesson plans not going according to plan. Many mathematical materials do not allow teachers always to use a scientific approach. Teachers consider the lecture method more effective. The results of this study are useful for educational managers in helping teachers and students overcome the difficulties that have been described.

Index Terms: Mathematics Learning Difficulties, Student Ability, Trigonometry and Probability, Scientific Approach

1 INTRODUCTION

Students often experience difficulties in math subjects in school. Based on interviews with teachers at one high school in Cimahi, Indonesia that the concentration of students during the lessons in mathematics less focused. They talk more often about other things when learning math. They rarely actively participate in the class. Most of them are passive while studying math. Even some students do not perform the tasks that teachers give because they still have difficulty in understanding the material. This condition makes their learning outcomes less satisfactory for teachers. Difficulties students have characteristics cannot calculate well; weak working memory, and difficulty in arithmetic procedures (Neville, 2012). Most children with mathematical difficulties are characterized by weakness in interpreting numerical symbols relating to numbers, number relations, and irregular areas. This difficulty in learning mathematics can happen to students almost at all levels during school, even to adults as well (Kareh, Sabandar, & Tjiang, 2013). Students are said to be thoroughly learned when getting a test score set by the curriculum of 75% according to the consideration of each school (Son, 2017). Many students get a test score of only 40%, so it does not match the teacher's expectations. Students are also less active in asking questions, listening to teacher explanations, discussing and solving problems. This condition must be improved so that students succeed in learning math. Factors that cause student difficulties include psychology, school environment, family environment, and community environment (Cahyono & Suhartono, 2012; Maftukhah, Harnanik, & Sunarto, 2012). Other factors affecting student learning difficulties include student ability, teacher ability, support facilities, school support, and family support (Maftukhah, Harnanik, & Sunarto, 2012). The student's ability factor is the most dominant affect the student's learning difficulties. To obtain the cause of the problems students and teachers in learning mathematics needs to be done further analysis on students and teachers in high school.

2 RESEARCH METHOD

This study uses the descriptive-analytic method to obtain a description of the subject through data collected as is (Sugiyono, 2009). This study focuses on the difficulties experienced by high school students in learning mathematics and adapted to the teacher's opinion on the information presented by the students. Subjects in this study consisted of

8 senior mathematics teachers and 63 students at one high school in Cimahi, Indonesia.

The instruments used consisted of tests, the scale of student opinions on mathematics lessons, and interview guides. This test is used to determine student learning outcomes on trigonometric materials and probability theory. The opinion scale is used to gain students' attitudes toward math lessons. Interview guides are used to get a direct response from teachers and students about the difficulty in learning math were presented in Table 1 below.

Table 1. Item questions on the interview guide

Item questions for teachers	
-	What are the learning difficulties experienced by students in the classroom?
-	Whether students can follow the learning method well?
-	Is the learning plan always applied?
-	Does the learning process in the classroom keep students active?
-	Are the learning facilities adequate?
-	What is the student's ability in understanding mathematics?
-	Can students think critically and creatively in learning?
-	Do students ask questions during learning?
-	Does the scientific approach make students understand math lessons?
-	How is the result of student learning in math lesson?
Item questions for students	
-	Did the teacher explain the mathematics material too quickly?
-	Has the teacher taught the concept of mathematics clearly and in detail?
-	Does the teacher give students the opportunity to ask questions?
-	Does the teacher provide exercise questions and check student answers?
-	Is the teacher's explanation of mathematics material difficult for students to understand?

3 RESULTS AND DISCUSSION

Learning is a process of interaction between the stimulus and the response experienced by the individual being studied (Thorndike, 1991). Stimulus comes from the desire of the learners themselves and the surrounding environment, causing a response to build knowledge. The more stimuli that come, the more responses are generated. In learning mathematics in the classroom, there is an interaction between teachers and students. When delivering the subject matter, the teacher provides the stimulus can be in the form of giving a problem close to the student's life. From these problems,

different student responses arise from one another. The response is right, and some are wrong. The role of the teacher directs the wrong student's response to the truth. Students who successfully solve problems from the teacher correctly, it can be told that the student has successfully learned in understanding the mathematical concepts given by the teacher. Bloom (1971) argued that learning is a process that comes from individuals who want to learn. The success of the learning process is determined by the readiness of the learners to understand the environment and itself. Thus, students who want to succeed in learning must be able to achieve maximum self-ability with pressing in the learning process. At the time students are given mathematical problems, the activities that students do in the classroom may be different, according to their learning motivation. There are seriously looking to solve the problem, and there are still confused on how to solve the problem, some do not try to do, chatting with other friends, and so forth. From the learning conditions undertaken by these students, the ones who will succeed in solving the mathematical problems are those who seriously learn by using all the fundamental knowledge they already have so that the given problem can be solved correctly. In the Law of National Education System, number 20 the year 2003 states that learning is a process of interaction between students with teachers and learning resources in the learning environment. In learning mathematics good interaction between teacher and student is needed, do not just happened dominance of interaction done by the teacher only. However, the dominance of students in learning activities is preferred; teachers act as mentors when students experience learning barriers. For student learning activities to be optimal, teachers need to arrange teaching materials in the form of student activity sheets that lead them to understand and work on mathematical concepts that feel abstract for them. Through these teaching materials is expected to think the high ability of students can be achieved. Based on the findings of Putra, Herman, & Sumarmo (2017), the activity sheets were designed using a scientific approach with the strategy of what if not to foster students' self-confidence in describing mathematical problems and solving them. Therefore, it is essential for teachers to create a student activity sheet so that the taught material can be understood in their way. Barriers to learning are focused on the difficulties students experience in understanding the material that teachers convey during classroom learning. Three factors can hamper the learning process of students (Brousseau, 1997):

- a. The mental readiness of students. In class, there is a wide range of students' skills in understanding mathematical concepts. Some students can attend math, some students understand when described repeatedly, and there are students who cannot afford to understand mathematics at all. This obstacle is caused by misconception or students' ignorance of the material to be learned with their primary ability, thus impacting their mental readiness in learning mathematics. Putra (2014) stated that of 35 high school students 85,71% students can think concretely and only 14,29% of students who have formal thinking ability to understand abstract mathematical concepts. One attempt to overcome these obstacles by repeating the basic concepts that students have learned so that they can link existing concepts with the next concept.
- b. The teaching method of teachers and teaching materials. The teacher becomes the determinant of student success

in learning. Teaching methods applied by teachers affect the students' absorption of the material delivered. Teachers should prepare preparation of lesson plans and the making of teaching materials that can make students actively involved in learning before teaching in the classroom. However, the target of delivering the material must be met; sometimes the teacher uses a method that makes the students passive and no longer able to compile the right materials. If teachers do not do proper preparation, they may cause difficulties in understanding the material presented by the teacher.

- c. Limited knowledge of students. Each student has different capabilities. Some can understand the material learned by noticing, some have to repeat it, and some do not know anything about the material. This is because students experience different learning environments. If students in the class are actively involved in learning material, the limited knowledge of students can be minimized. Sometimes people with limited knowledge do not participate in learning activities, and they are limited to being present in the classroom.

The results of student opinions on mathematics learning were presented in Figure 1 below.

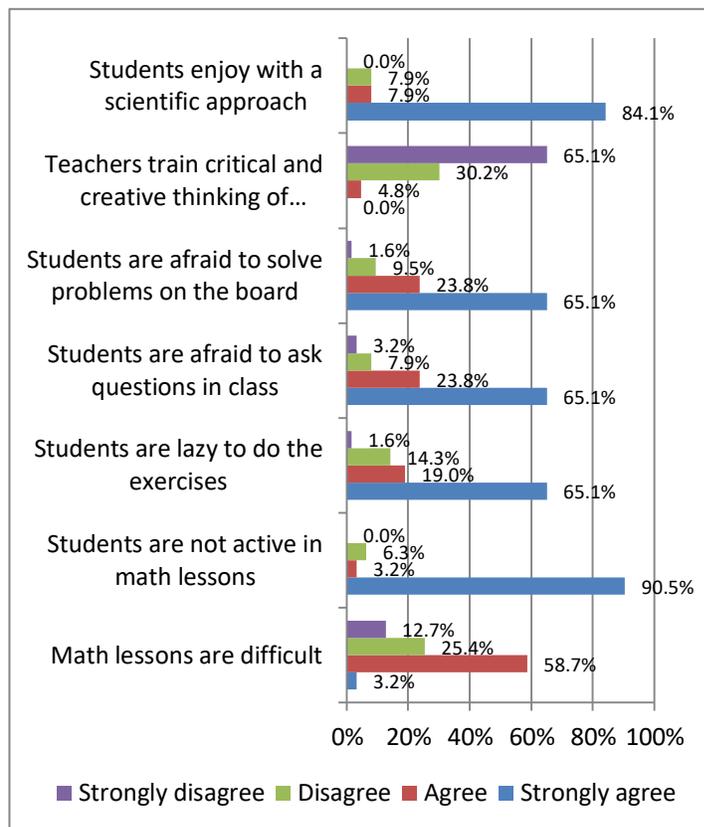


Figure 1. Percentage of students' opinions on mathematics learning.

Students should be able to understand the various concepts of mathematics (definition, theorem, evidence) and then use them to solve the problem (Mason, 2002). Most students (58.7%) feel that mathematics is a painful lesson. This difficulty is generally caused because they do not understand the concept (Supratman & Herlina, 2017; Putra, Setiawan, Nurdianti, Retta, & Desi, 2018). Students can understand the

mathematical concepts if they often do the exercises. However, most students (65%) are lazy to do the exercises. Most students (90.5%) are not actively studying math, and they are more silent giving no argument. This condition is caused by the teacher using the lecture method, and the student becomes the listener whereas most students (84.1%) enjoy learning by using scientific. Teachers can not always use scientific approaches because there is much time for many subject matters. Students are afraid to ask questions and express answers in front of the class. They are not sure the answer is correct. They are also worried his friends laugh at his mistakes. This situation causes the students' critical and creative thinking ability not to develop properly.

The results of interviews with students obtained indications that cause learning difficulties experienced by students in Table 2 below.

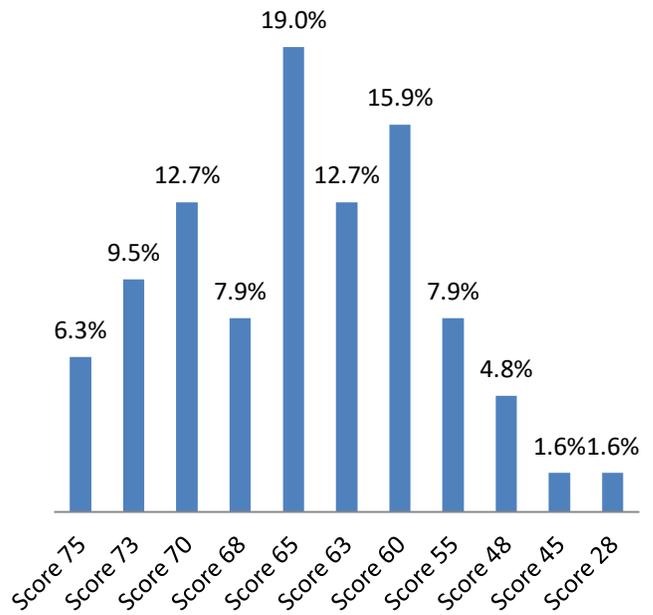
Table 2. The result of the student interview

Item questions for students	Students answers
- What are the mathematical materials that are difficult for you?	- Trigonometric and probability theory is difficult to understand,
- Did the teacher explain the mathematics material too quickly?	- Sometimes teachers explain the concept quickly, so it is difficult to understand.
- Has the teacher taught the concept of mathematics clearly and in detail?	- The teacher explains in a quiet voice and writes a mathematical concept on the board without explaining the discovery of the concept.
- Does the teacher give students the opportunity to ask questions?	- Teachers rarely ask students to ask because of the focus of writing the concept of mathematics on the board.
- Does the teacher provide exercise questions and check student answers?	- Teachers provide training and discuss together.
- Is the teacher's explanation of mathematics material difficult for students to understand?	- It is difficult to understand the teacher's explanation because many of the formulas are presented in a short time.

Trigonometric materials and probability theory include material that students avoid in learning mathematics. Hearing the word trigonometry alone makes students so lazy to learn, this is because it is formed in students' thinking that trigonometry contains materials that are difficult to learn. This opinion is by Winarni (2016) which states that trigonometric formulas are too numerous to memorize students so that they are difficult to apply in math problems. In understanding the concept of trigonometry students require a relatively long time. The efforts of the teachers by slowly teaching the concept of trigonometry adjust the condition of students and class. Other mathematical materials that are difficult for students are a probability. This opinion is supported by Hutahaean, Sutawidjaja, & Susanto (2016) which states that the probability is often regarded as material that students do not like. Though this material is essential to learn because it is often experienced in everyday life. On probability theory, students have difficulty in translating sentences. Students' understanding ability is still low (Putra, Setiawan, Nurdianti, Retta, & Desi, 2018). Students are confused with solving the story problem that must be translated into symbol or math language. Students are only guessing the meaning of the word for word in probability and trigonometry. Students do not understand the procedure in solving probability and trigonometric problems because their

problem-solving ability is still low (Putra, Thahiram, Ganiati, & Nuryana, 2018). Lack of working on problems as an exercise causes students not trained in solving math problems. Some students tend to relax in learning, not understanding the importance of learning math. They are less careful in working on the problem, tend to rush, not understood word per word in question. Students' ability to identifying data adequacy at the problem is still low (Putra, Putri, Lathifah, & Mustika, 2018). Teachers tend to dominate activities in learning. Students tend to be calm when asked by the teacher. Students do not dare to answer or ask questions. They do not understand the benefits of learning math. Students still have difficulty in critical and creative thinking. Students still have difficulty connecting mathematics with its application in everyday life. Students still have difficulty with a reasoning math problem.

Data distribution of students test scores were presented in Figure 2 below.



Percentage of students pass the test scores

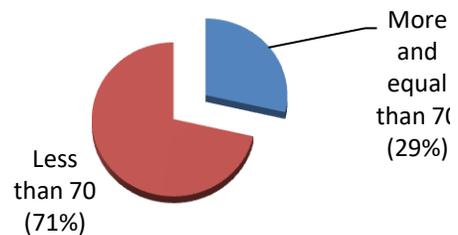


Figure 2. Students test scores

The test score of most students (19%) is 65. The standard score of learning completeness is 70. Students will complete in learning if they get a score of at least 70. Based on the data in figure 2 only a small percentage of students (29%) complete in learning because it obtains score test more and equal to 70. Most of the students (71%) still not complete in learning so that teachers need to give remedial teaching to students outside of school hours.

The results of interviews with teachers obtained information about the problems in learning in the following table.

Table 3. The result of the teacher's interview

Item questions for teachers	Teachers answer
- What are the learning difficulties experienced by students in the classroom?	- Students have less motivation in learning mathematics.
- Whether students can follow the learning method well?	- Most students have difficulties in understanding the concept of trigonometry and probability theory.
- Is the learning plan always applied?	- Students need a relatively long time to understand.
- Does the learning process in the classroom keep students active?	- Sometimes the lesson plan is not working as expected because students are difficult to understand the lesson quickly.
- Are the learning facilities adequate?	- Students are less active following learning, and they are afraid to ask the teacher directly because they do not want to be laughed at by other friends. There are still students doing other jobs that are not related to learning such as chatting and annoying other students who are learning.
- What is the student's ability in understanding mathematics?	- Learning facilities in the classroom are complete. There is also a projector, but it is rarely used because it takes more time in using it.
- Can students think critically and creatively in learning?	- Students do not understand the procedure for solving the problem. Students are only guessing by answering questions.
- Do students ask questions during learning?	- Only 25% of students in the class can solve the problem correctly. Their critical and creative thinking skills need to be developed.
- Does the scientific approach make students understand math lessons?	- Students tend to be silent when asked by the teacher about the mathematical material being studied. Scientific approaches make students actively learn because there are five stages of observing problems, asking questions, trying to solve problems, reasoning solutions, and communicate the solution. Not enough time to use a scientific approach to each material, so much use of lecture methods.
- How is the result of student learning in math lesson?	- Student learning outcomes are less satisfactory, so they are given remedial teaching outside of school hours.

The lesson plans are organized in one semester at a time before learning begins. As a result, the learning model that has been designed by teachers in the lesson plan has not been implemented, because the condition of the students in the classroom is not in accordance with the teacher's expectation when preparing the lesson plan, so the teacher tends to use the lecture method to convey the material in accordance with the learning target. Teachers are also often disturbed by the sudden schedule of school activities so that the lesson plan is not appropriate, and the chapter should have been discussed in three or four meetings because the clash with the event eventually became two meetings, finally made the compaction of the material that causes student learning outcomes are not maximal. Teachers tend to dominate learning activities in the classroom — students as

many as 63 only 50% who do the exercises. A soft teacher's voice causes students to be unable to hear clearly what the teacher is saying. The environment also influences the success of learning. Students expressed that the learning atmosphere that hampered their learning was because they did not focus on learning because of the non-conductive classroom atmosphere. Some students talked about other issues outside the learning materials. Another student who asks his or her congressman is annoyed by his concentration while focusing on the material presented by the teacher in front of the class causing the material to be missed. After obtaining the problem through the identification stage, proceed with problem analysis to find out the follow-up process of the solution to be used. Based on the results of interviews with teachers, efforts made to minimize student difficulties can be in conveying difficult mathematical materials, such as trigonometry and probability theory, need to be explained slowly adjusted to the level of the student's ability. In one chapter, do not teach the material in just two meetings, but can be taught with three or four meetings, so that students are not overloaded to understand the material. In material probability, students can work on short questions only. When it comes to the story they are quite confused even though the subject is contextual, but they are still confused, in which case it is necessary to explain the word per word and what must first be done in answering the question, besides with many repetitions making the students understand the intent of the matter. Students are given instructions on how to solve problems by guiding them to understand the basic concepts that must be mastered. Some mathematical material can be delivered with a scientific approach and some more with lecture methods, so it is necessary to combine these methods in the classroom according to the current state of the student. The existence of the lure of value addition is expected to motivate students to ask the teacher about something that has not been understood or already understood. By the opinion of Setyanta & Murwaningtyas (2012) that the addition of grades or points to be obtained students can lead to their passion and enthusiasm for learning mathematics. Next, convey to the students the benefits of learning mathematics (the essence of mathematics) so that students who do not understand how the application of mathematics in everyday life. In the face of students who have difficulty in asking questions, often ask questions to some of the students. To improve reasoning skills, connections, critical thinking and creative thinking still requires maximum effort from teachers. Use some appropriate alternative methods in mathematics learning, so do not get caught in just one method. Take advantage of math learning media in the form of props that exist in the school environment. Make students a learning center actively involved in classroom learning activities in discovering the mathematical concepts they are learning.

4. CONCLUSION

The results of interviews with students concluded that the material trigonometry and probability is the material that students avoid in learning mathematics, the lack of doing the exercises to make students not trained to solve mathematics problems, some students do not understand the importance of learning mathematics in life so not enthusiastic about mastering the concept, Less careful and do not understand the purpose of the problem, teachers tend to dominate the learning activities, students tend to be silent when asked

teachers to ask questions, students' skills in reasoning, critical and creative thinking has not developed correctly. Based on interviews with teachers concluded that the lesson plans is arranged in one semester at a time so that the model of learning that has been designed becomes unavailable because the condition of the students in the classroom is different from the teacher's expectation when preparing the lesson plan, the sudden schedule of school activities makes the lesson plan does not go according to plan, The material that should be completed in three meetings shortened to two meetings because the other activities are consequently the learning becomes not optimal, the target of learning that must be achieved to make the teacher does not always use the learning approach but choose the lecture method that feels more effective in delivering the material as a result teachers dominate learning, The noises in the class make the teacher's voice when explaining the material is not heard clearly by the other students. To minimize the difficulties of students in learning mathematics put forward some suggestions, which is to say slowly and word per word, what students should do in answering questions that are difficult to understand students such as trigonometry and probability. Do much repetition of mathematical concepts so that students become accustomed to using the mathematical concepts. Use a variety of approaches and methods in learning. Teachers can use a scientific approach to help students find concepts and apply lecture methods in guiding students who are still confused in solving problems. Besides, the approach of project-based learning can also be an alternative in learning. Based on research of Putra & Purwasih (2015) the percentage of activity through a project-based learning approach is 70,93% higher than using the expository method (lecture) is 69,41%. Also, the improvement of learning achievement through project-based learning approach of 84.57 is higher than using the expository method of 72.79. Based on the data, add value as a bonus for students who actively express their opinions about the material being studied. Through the addition of this value, students are expected to be motivated to ask questions if still confused by the teacher explanation. This is by research conducted Lisniawati (2017) that the incentive in the form of added value good impact for student's motivation and achievement, that is equal to 68,05% and 60,08%. Next, convey to the students the benefits of the material learned, so that students feel the need to master the mathematical concept. For students who have difficulty expressing their opinions, they can be helped by asking questions of them to express their opinions. Use a combination of learning approaches with the right method of delivering mathematical material for students to understand easily. Involve students in each learning activity so that they can get sidetracked from other activities beyond learning.

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