Special needs students’ responses toward discovery learning (A PDS Project)

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Abstract. Mathematics lesson is considered to be a difficult lesson for such students. As a consequence, their achievement in math is still very concerning. Thus, we need a learning model that makes students give positive responses toward math lesson. Discovery learning is as an alternative. But, there are schools that students of a class consisted of normal and special needs students. Implementation of learning process cannot be separated from those two kind of students. Thus, this article attempts to discuss students’ responses toward discovery learning process by focusing on special needs students. To this aim, participant observation and documentation were conducted to reveal the data. The subjects of this study were students of Grade 9 SMP Pembangunan, Padang city. The findings shows that students give positive responses to the model especially in their attitudes towards discovery learning.

1. Introduction

Improving the quality of education, especially school education, continues to be pursued by the government of Indonesia. These efforts include improving the existing curriculum, from the 1994 curriculum to the 2013 Curriculum. The improvement is done so that the abilities and skills obtained by students are expected to have same standards in all regions. To this aim, the improvement includes all variables of education process in class, such as quality of the educator and learning process. The learning process itself is influenced by internal factors and external factors. Internal factors are all factors that come from within the individual, including physical factors, psychological factors such as intelligence, attention, talent, learning style, interest in learning, motivation to learn etc. While external factors are all factors that come from outside the individual, including learning methods, school environment, conditions at home, neighborhood, learning facilities, learning model, method, assessment, learning media and also technology.

In the case of external factors that influence the learning process, in Indonesia, there are various kinds of school environments, such as general schools, special schools, inclusive schools and vocational schools. Some general schools consist of normal students and some students with special needs. The teacher in a class where there are students with special needs must be able to choose a learning model that is suitable and can improve learning outcomes of these two types of students.

Meanwhile, researchers are trying to apply new model to learning mathematics education to improve the quality of learning process that teachers can implement it in their class. Many researchers around the world agree that learning process must in accordance with real world needs today. 2013 Curriculum deals with this issue. One of the proposed model in 2013 Curriculum is discovery learning.
One of the things that needs to be considered by a teacher in making his learning successful is to create a learning condition and climate that can stimulate and enhance students' positive attitudes in mathematics learning. Through discovery learning, teachers can achieve it. Ministry of Education and Culture of Indonesia explains that the principle of discovery learning is students are encouraged to identify what they want by searching for information themselves then organizing and constructing what they have known in a final form such as a concept, procedure or fact knowledge. The phase (syntax) of the discovery learning model are stimulation, problem statement, problem identification, data collection, data processing, verification and draw conclusions or generalization [1]. Thus, discovery learning provide learning environment where students is as an center of learning process. Akey say that a classroom environment where teachers support student activities can make students have the confidence to succeed [2]. Thus, the learning approach used by the teacher certainly just affect student attitudes, we can observe this attitudes through students responses during learning process.

Dealing with general schools that a class consist of normal and special needs students, teacher can try to use discovery learning as the model. Discovery learning makes students actively in touch with the learning material, such as media to find a concept. They experience the process of finding a concept, procedure or fact by themselves. Special needs students commonly have to have this self experience. But since many researchs related to special needs are not focusing on how their responses to the new model in a general class, thus this study try to fill in the gap. According to these matter, this study attempt to answer the question “how are special needs students’ responses toward discovery learning?”

2. Method

2.1. Research Design
A case study was conducted to reveal the data qualitatively. Since case study focuses on particular group or an individual [3]. This study focuses on special needs students. To ensure the validity of this research, triangulation was used in order to obtain a more complete picture of what is being studied and to cross-check information [4]. This study used triangulation of the data collection.

2.2. Site and Participants
This study was conducted at general schools, junior high school, SMP Pemban gunan class 9C Padang city. There were three special needs students in this class as the subject of this study.

2.3. Data Collection
The data were collected through observation and documentation. First, observation was employed to observe the students responses during learning process. There was two observers of the process. An observation sheet was used to guide the observation. Documentation of students answer sheets of cognitive test was used to investigate whether students responses in line with their math achievement.

2.4. Data Analysis
The collected data were then analyzed in a qualitative method that involves analyzing, synthesizing, and reducing the information that was not needed [4].

3. Result and Discussion
This study was conducted in the topic of characteristics, surface area and volume of cylinder and cone. Discovery learning suitable for this topic because students needs to engage actively in experiment to discover concept of surface area and volume, also to find formula for calculating the surface area and volume. Researcher observed three types of special needs students, namely hyperactive student, crying student, we call her by this term because she often cries before going to school everyday, and taciturn students. Hyperactive and crying students are guided by a personal guide, while taciturn is not.

There were 4 times meeting of learning process. First, meeting discussed characteristics and surface area of a cylinder. Second, meeting discussed volume of a cylinder. Third, meeting discussed
characteristics and surface area of a cone. Last, meeting discussed volume of a cone. At the beginning of each meeting, teacher gave apriori perception to students and stimulated them to remember preceding topics that are as basic for the topic being studied.

In the topic of cylinder elements and finding the formula for the surface area, media namely colored paper, cans, scissors and rulers were used. Students were asked to trace the base and the lid of the cylinder into the paper and then cut out the tracing results and observe the shape formed. Then wrapped the paper into the vertical side of the cylinder and observed the shape formed.

In the second meeting was used several coins of the same size, paper and rulers. Students were asked to measure the diameter of a coin and its height. Then students pile up a few coins one by one on paper and repeat the steps to measure the diameter and the height of the pile of coins. This was an activity to find the cylinder volume formula.

The third meeting, a cone-shaped hat, paper, scissors and a ruler was used as media to understand cone elements and find the formula for cone surface area. Students did activities that were tracing the side of the hat to a paper and then cutting. Students also cut out the sides of the hat and observed the shape formed.

The fourth meeting was the activity of finding the volume formula for cone. Students were asked to do experiment outside the classroom, using media namely cylinder and cones of corresponding sizes, rulers and water. Students first measured the size of the cylinder and cone, then moved the water using the cone into the cylinder and repeated this step several times until the cylinder was full of water.

During those learning process, observers observed special needs students responses. At the end of the meeting was given cognitive test to ensure whether their achievement in line with their observed responses.

The results of observation are as follow:

1) **Subject 1 (hyperactive student)**
   - At the first day: like to walk outside the class almost at whole time learning, not doing an experiment
   - The next day: like to walk around in the class during learning process, then sit and do the experiment, also do the task given in the students’ worksheet but need much time
   - The third day: like to sit in class, listen to the teacher, do the experiment and task, gives much attention to the teacher explanation, look interested to the activities, plays the media, like to touch the media
   - The last day: work together with the crying student, brave to raise his hand and say that he want to do the exercise, write his answer in the white board. It’s very surprising. When teacher gives applause he say “boleh saya masuk SMA?” (in english : “ may I go to senior high school?”). Like to do a “toss” with his personal guide when he think he can do the task. Can finish the task in less time than before.
   - Cognitive test result: can complete the problem better than normal students. Although his writing is too big compared to normal students.

2) **Subject 2 (crying student)**
   - At the first day: busy with her own interest, sit in class, not make a conversation with her group members
   - The second day: give attention to the teacher explanation, like to write teacher explanation
   - The third day: like to touch the media and play with this media, do the task, often come closer to the whiteboard and ask teacher when she do not understand something, very impressive. Happy when teacher gives her praise.
   - The last day: work together with hyperactive student, look interested to the activities and task, ask teacher when she do not understand a thing related to the task.
• Cognitive test result: in the last four meeting, she was able to complete the task given as good as normal students, but when the test begin she do not make meaningful word or meaningful attempt of the answer.

3) Subject 3 (taciturn student)
• The first day: not make a meaningful conversation with her classmate and group of discussion. Other students in her group also do not start conversation with her. Not doing the task given.
• The second day: give attention to the teacher explanation but still taciturn, not make a conversation with her friends. When teacher try to give her all the material so that she can study it by herself, she refuses it. When teacher shift her to the other group, she also refuses it and says that she wants to be in this group.
• The third day: like to touch the media and long stare the media. Try to do the task, but not finished yet
• The last day: look happier than before, not make a conversation with her friends but work together with her group member. Try to do the task but still not finished in the time given.
• Cognitive test result: write meaningful attempt of the answer

4. Conclusion and Suggestion

4.1. Conclusion
According to the purpose and the result, conclusions of this study are as follows,
1) Different types of special needs students' characteristics give different specific responses
2) Let students to actively have contact with or touching media is more beneficial for them
3) Students like to oftenly be praised by teacher and it gives positive learning atmosphere to their activities in class
4) Need special attention to the taciturn student. She needs help and also encouragement from teacher to make conversation with friends and get along with them.
5) Overall, if we further implement discovery learning model to the several meeting, to a topic that suitable, it will give positive effect to the students especially their attitudes, but still need improvement for their cognitive.

4.2. Suggestion
It is impossible for teacher to specialize teaching model for a special student in a class, because learning process engage every element, teacher and all types of students concurrently. Thus, it needs further study that is focusing on internal factors of one type of special needs students deeply and plan a solution for him or her.

If researchers want to examine special needs students' cognitive skill, then choose subjects that do not have special cognitive problem if this problem is the reason why they are called “special”, because it may be really difficult to study.

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