

THE DEVELOPMENT OF REASONING SKILLS FOR MATHEMATICS STUDENT MAJOR ON SECOND YEAR BY USING SOCRATIC METHOD QUESTIONING

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Abstract - The Learning of Mathematics Major Student on second year have many problems such as Student can't use reason for explain to connection content in mathematics, Student can't create a question for learning mathematics and Student have no deep knowledge in mathematic. This research is experimental research, have an objective to 1) Develop reasoning skills of Mathematics Student major on second year and 2) Study of Student Satisfaction learned by Socratic Method Questioning. The target groups are Mathematics Student Major on second year 58 people registers in Geometry for teacher subject. The instrument applied for data collection was the assess reasoning skills form. The data obtained were analyzed by the applications of percentage, mean and standard deviation. The study findings revealed the following: 1. The effects of reasoning skills of Mathematics Student major on second year after using Socratic Method Questioning were higher than the 80% prescribed criterion. 2. The scores on questionnaire showed an average satisfaction of the experimental group toward the instruction.

Keywords - Development, Reasoning Skills, Socratic Method, Questioning

I. INTRODUCTION

Regarding to the education at the present time has found student major of mathematics lack of analysis reasoning, connection, summary and interpret that is affect to these students are not able to analyze to the importance of the subject of learning which is affect to students would not actually and profoundly take the knowledge. In this case, the research takes Socratic Method Questioning to research because the Socratic Method is efficiency pattern to develop the reasoning skills to be influential analyzed skill. That would affect to actually and profoundly take the knowledge which is consisting of 5 steps as follow; 1. suspect 2. discussion 3. define 4. inductive reasoning 5. deductive reasoning these 5 steps would strengthen the student can reasoning thinking and summarize the knowledge by themselves.

II. LITERATURE REVIEW

2.1 What is Reasoning?

NCTM (2009); Reasoning is the process of drawing conclusions on the basis of evidence or stated assumptions. Reasoning is important in all fields—particularly mathematics. Mathematical reasoning involves drawing logical conclusions on the basis of assumptions and definitions. IPST (2008, p.45); Reasoning is Skills/Process that supports Student for reason thinking and have good thinking system. It can help student to analyzes problem and situation correct.

2.2 Why was develops reasoning skills

Facione (2006) defined it as process of reasoning and judging based on reliable and correct principles. Nugent and Barbara (2008) said

the reasoning process also helps enable. the critical thinking in 3 aspects:

- (1) Reasoning process is finding a solution and it starts from specifying problems, exploring and selecting alternatives and obtaining a right solution.
- (2) Making a decision based on reasoning is contemplating on information carefully, using logic to revise and judging the result acquisition.
- (3) The scientific method is a string of logical process, all of which prevents rushing to a conclusion or judging too quickly without enough facts or knowledge, starting from identifying problems, collecting relevant data, hypothesizing and testing whether the hypothesis is true

2.3 Socratic's Method

Socratic Method is the arts of conversation which Socratic converse to find the resolution of any issues which is discussed this pattern has generally called Dialectic which consisting of 5 steps as follow

1. Suspect; Socratic started the conversation to raise the converse that the converse is expert in the subject which he would like to know because he has not known in the subject that he ask to beg for answer in the subject this started point is the modestly of philosopher
2. Discussion; After that Socratic will questioning to the converse that is pattern as questioning- answering the converses would define in the subject of conversation 'Socratic will criticize this define which may defectively and the converse will advice the new define which be concisely to Socratic will refine this define the conversation will I the both parties will be appreciate the define.
3. define; the objective of conversation is depend on to find the correctly define Socratic believes that

there we found the correctly define of the subject that we found the authenticity of that objective which is in deed same as the explore of objective imagination

4. induction; the definability would start from the specific - thing to the international - thing when define of the right; Socratic and the converse will consider the example of any rights in the society and take the dominant feature or the international to define the define

5. deduction the definability will be proved by take that to be any specific measure which may same feature as specific define such as if we took the define of the right then we would prove that the ownership is right as the define which may be specific The pattern of Socratic questioning method consist 6 classes as follow;

1. Conceptual clarification questions: that question is teacher require the learner would clarify with their answers which the learner will realize again to the objective of the question for the corrective of the answer that is checked the thought after sent any answers.

2. Probing assumptions: that question is required to the learner has thought about assumption and belief that may still not certain which students explore during discussion the using question would explore the fact

3. Probing rationale, reasons and evidence: Due to the most people would like to give their opinion which may not reasonable or there are weaken supported information; therefore this kind of question that requires the learner find additional reason to support the answer is from the discussion which is reasonable with evidence assure and that is not only presumption.

4. Questioning viewpoints and perspectives: the questioning which is required the learners give their opinion or the other reliable point of view.

5. Probe implications and consequence : this question is required n the learner estimate to application and after result which may affect.

6. Questions about the question: this question require to the learner realize to the question which has questioned the feature of this question is reflection the question to the questioning

III. RESULTS AND DISCUSSION

3.1 Design of the Study

This using research pattern is a group which has the post-test which is pattern of Socratic with target group and make evaluated.

The research method is consist of

1) the learning application of Socratic Method Questioning amount of 17 plans each plan take learning hour 3 hours

2) reasoning evaluated form satisfaction of student valuated form the researcher would take the research amount of 17 periods each period is 3 hours which manage to separate the learning hour by Socratic Method Questioning amount of 15 periods And Post-test 2 periods

3.2 Outcomes and Discussion

This research is experimental research, have an objective to

1) Develop reasoning skills of Mathematics Student major on second year.

2) Study of Student Satisfaction learned by Socratic Method Questioning.

IV. DISCUSSION

from the Result shows that Socratic Method Questioning can helps student to develop reasoning skills because following

Steps	Results
1) Suspect	1. All Student will to explain about knowledge on The Topic for study in Classroom. 2. Student have to answers a question from teacher and friend when have any question. this step Student were developed communicate skill and reasoning skills because student will thinking to answers from questions and explain why they have to thinks.

3.3 Results of Descriptive Statistics Analysis.

Table 1: The score of Reasoning Skills of Mathematics Student major on second year.

N	\bar{X}	S.D.	Percentage
58	3.00	0.73	60

Form the table 1 show that the score of reasoning skill of mathematics student major on second year have to average is 3.00 ($\bar{X} = 3.00$) and standard deviation are 0.73 (S.D. = 0.73)

Table 2: Student Satisfaction learned by Socratic Method Questioning

N	\bar{X}	S.D.	Percentage
58	4.69	0.53	93.80

Form the table 2 student satisfaction learned by Socratic Method Questioning have to average is 4.69 ($\bar{X} = 4.69$) and standard deviation are 0.53 (S.D. = 0.53). The satisfaction of the students in overall aspects was at high level.

2) Discussion	<ol style="list-style-type: none"> 1. Student answered the question from teacher. 2. Student and Teacher discuss to find conclusion of the topics. 3. Student and Teacher helping to find good definition for the topics together. 4. Student and Teacher have to review the definition again for complete. <p>this step Student have to analyze information from all answer and integrate information to create definition on the topics learning. after get the definition Student will check the definition that it's complete? If it not complete student will to find information to make it complete.</p>
3) Define	Student use all reason for create the definition and connect between Old knowledge and New knowledge that get from discussion.
4) Induction	<p>Student will study an example and practiced by using activity to create new theory or new definition. Student can prove a theory to formal and uses correct reason.</p> <p>For activities have to many methods such as using the Dynamic Geometry program for surveys geometry properties or using a concrete object in geometry for learning.</p>
5) Deduction	<ol style="list-style-type: none"> 1. Student can select to use a theory to problem solving. 2. Student can analyze between correct and incorrect of problem by using reason.

from table show that Each Steps will helps Student developed reasoning skills from basic to advanced. for this process student have to explains, asks question and answers by themselves. When have discussion on any topics, Student can disagree with friend in class by using a reason to support argument. In line with Suttiiphong Boonphadung (2017) said that the teaching methods used in this study emphasize the students' hands-on experience and construct knowledge through learning by doing, how effectively a teacher runs major and minor learning activities and how well a teacher prepares related worksheets, practices and tests for a pre-activity, while-activity and post-activity in a coherent manners are a key to students' success in learning. Questioning

to student is very importance, Teacher will create a good question because a good question will help student select reason to answers and connects knowledge to problem solving or create new knowledge. for a problem this process consist of

1. Use much time because all student has to explain on the topic in class and discuss to find conclusion of the topic.
2. Teacher has to arrange question level from basic to advanced, so question item have many to enough for situation.
3. Student can't create question by themselves when begin the process.
4. Student use much time when practices by using the dynamic program or concrete object

V. SUGGESTION

1. teacher make grouping student 3-4 people per group
2. teacher assigns student to study topic and create a question before learn next class.
3. Student will have to knowledge about using the Dynamic Geometry before doing activity.
4. Student changes role in their groups that everybody will answer a question and use reason.

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