

# Improving Problem Solving Skill and Self Regulated Learning of Senior High School Students through Scientific Approach using Quantum Learning strategy

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**Abstract.** This research is quasi experiment with control group pretest-posttest design. The sampel in this research using the tehique of purposive sampling so the samples used were two classes of the 11<sup>th</sup> grade students of SMAN 14 Bandung in the academic year 2017/2018. The experiment group uses saintific approach using Quantum Learning strategy and control group uses saintific approach. In collecting the data the researcher will use the test of problem solving ability and self regulated learning as the instrument. The aims of this research are to:1)find out the improvement of students mathematical problem solving through scientific approach using Quantum Learning study, 2) find out students self regulated learning through scientific approach using Quantum Learning.

## 1. Introduction

Learning is a complex process, everything that enggages in learning process suc as each word, thought, action, association, and to what extent you change the environment, presentation, and teaching design, to the extent that the learning process takes place [1]. The lesson which is taught should be in accordance with the general objectives of learning according to the Ministry of National Education as stated in Law No. 20 of 2003, having the purpose of national education to develop the potential of learners to become human beings who believe and fear Allah Almighty, morals, healthy, knowledgeable, Capable, creative, independent, and to become a democratic and responsible citizen [2]. One of the areas of science taught is the field of mathematics. It is based on the importance of learning mathematics for future life for learners. Mathematics is important as the mentor of the mindset as well as the formter of attitude [3].

In the Regulation of the Minister of National Education of the Republic of Indonesia Number 69 of 2013 on the Content Stand mentions solving problems that include the ability to understand problems, build mathematical models, solve models and interpret solutions obtained as well as to solve problems in everyday life (real world) [4]. The student's mathematical problem-solving abilities are very important in mathematical learning because it is the ultimate goal in teaching mathematics, even the problem-

solving ability is the heart of mathematics [5]. Cooney explains that problem-solving skills are essential so that students can solve problems they face and help students think analytically in making life's daily decisions [6]. Thus, students' mathematical problem solving skills are important in achieving the learning objectives.

A student is an active participant who maximizes his or her opportunity and ability to learn [7]. In learning the students not only control cognitive activity (metacognition), but also develop skills related to the will which enables to regulate attitudes, environment, and behavior to improve positive learning outcomes. An important factor of students influencing learning is Self Regulated Learning. Self Regulated Learning is the ability of children to do learning activities in a responsible manner that is driven by self-motivation and achievement of learning achievement is as good and as optimal as possible. In conducting learning activities students are required to have Self Regulated Learning, because the existence of Self Regulated Learning will achieve optimal learning outcomes. Piaget explained that the long-term goal of education is to develop Self Regulated Learning students [8].

## **2. Experimental Method**

This research is quasi experiment with control group pretest-posttest design. The sampel in this research using the technique of purposive sampling so the samples used were two classes of the 11<sup>th</sup> grade students of SMAN 14 Bandung in the academic year 2017/2018. The experiment group uses saintific approach using Quantum Learning strategy and control group uses saintific approach. In collecting the data the researcher will use the test of problem solving ability and self regulated learning as the instrument.

## **3. Result and Discussion**

Problem solving is a process for overcoming difficulties encountered to achieve a desired goal [9]. Problem solving is a stage in which when an individual is faced with a problem, he is not necessarily able to find a solution, even in the process of completion he is still in deadlock [10]. In solving mathematical problems, concrete steps are needed so that the answers can be true. In relation to mathematical problem solving, Polya spells out four phases of the model in the process mathematical problem solving [11], namely:

- i. Understanding the problem.
- ii. Devising a plan
- iii. Carrying out the plan
- iv. Looking back

According to the results of students' math problem solving skills tests that have been done, students have difficulty when they are given the problem-solving problem. Here are examples of problem solving and some student error answers:

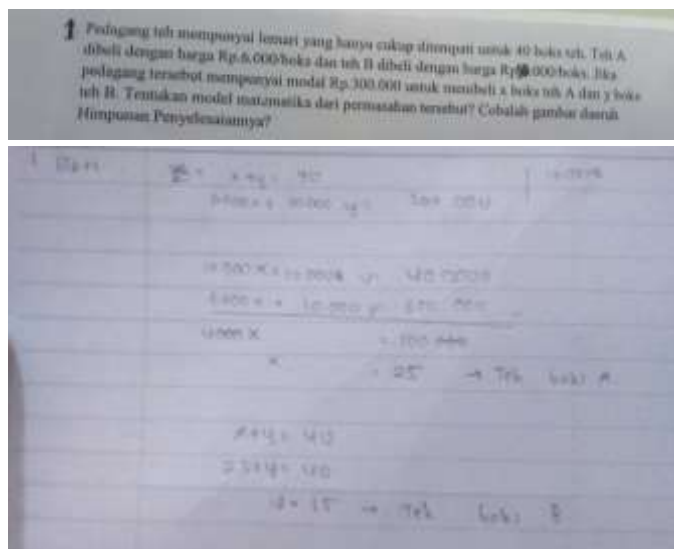


Figure 1. The Students Answer

Based on the results of the students' answers shown in Figure 1, it appears that the students did not show an understanding of the problems given in accordance with indicators of mathematical problem solving skills that must be achieved where students can create mathematical models of situations or daily problems and solve them. The mistake made by students is that students do not understand the problem given so that students can not turn the problem into a mathematical model to determine the area of the completion set.



Figure 2. The Students Answer

Results of student answers in Figure 2, it appears that students have been able to explain math problems into the appropriate image form. However, students have not been able to turn the problem into such an appropriate mathematical model. The student made a mistake in creating a linear inequality. This shows that students do not understand the problem given so that the strategy or the student's solution is not correct.

According to students' ideas on this issue, they feel like they can not solve problems because they require higher analytical skills than ordinary problems. So students still need some instructions to solve the problem, because students find it difficult to understand the sentence, students can not distinguish the information provided and the purpose of the problem, using a strategy to turn the story problem into a weak

mathematical expression. Students are difficult in developing problem-solving skills because students only memorize concepts and students can not use the concept if they encounter an uncertain problem.

Based on the interview of the researcher to some students, it is found that the lack of Self Regulated Learning attitudes leading to students dependence on what teachers have to say in the classroom without studying or studying individually or in groups with personal initiative to have further understanding the material. An important factor of students influencing learning is Self Regulated Learning. Self Regulated Learning is the ability to monitor, regulate, control aspects of cognition, motivation, and self-behavior in learning [12]. The indicators of learning independence, namely:

- i. Learning initiative
- ii. Have the ability to determine your own destiny
- iii. Diagnose learning needs
- iv. Creative and initiative in making use of learning resources and choosing learning strategies
- v. Monitor, manage, and control
- vi. Ability to restrain yourself
- vii. Make your own decisions
- viii. Able to solve problems.

Quantum Learning is a learning model that views instructional execution like a music game orchestra-symphony where teachers create a conducive, dynamic, interactive, participatory, dynamic, interactive, and respectful environment. This triggering figure is Bobbi Deporter since 1982. There are four characteristics of a conceptual framework about the steps of a Quantum Learning model [12], namely:

- i. There is an element of democracy in learning
- ii. There is satisfaction in students
- iii. There is a stabilizing element in the material or a skill that is taught
- iv. The existence of an element of the ability of a teacher in formulating the findings produced by students, in the form of concepts, theories, models, and so on.

The steps of Quantum Learning [12]:

- i. Teachers motivate students to learn. At the beginning of implementation, Teacher provides the learners with the motivation to continue learning both orally and in writing.
- ii. Structuring a conducive learning environment, pleasant arrangement of the atmosphere, environment and atmosphere that is not too formal, arrangement sit half-circle without a table, arrangement of light or good light so that participants feel relaxed and relax.
- iii. Teachers cultivate a winning attitude in students, students with antisis and optimistic work together or individually encourage each other in doing tasks and understand each material context as well as teachers provide positive feedback from each student condition.
- iv. Teachers free the students to determine their learning style, provide background (background) classical or instrumental music that has been proven to give a positive influence in the learning process. Classical music from

Mozart, Bach, Bethoven, and Vivaldi can improve the ability to remember, reduce stress, relieve tension, increase energy and increase memory

- v. Teachers familiarize to take note and to read, Teachers are given opportunity to record and read students in learning.
- vi. Teachers encourage students to be more creative in learning, in understanding and processing of brain information described in the form of symbols or associations so that the material will be easier to digest when more presented in the form of pictures, diagrams, flow or symbols, and connect with the surrounding environment.

Quantum Learning is a comfortable and fun learning process, Quantum Learning is a learning strategy that can be used by anyone other than students and teachers because it provides an overview to explore anything in a way that is steady and memorable, the way is a learner must know in advance their learning styles Respectively, the style of thinking and how the situation itself in absorbing the lessons conveyed [13]. Students who have various potentials are directed in accordance with their character and learning styles through learning steps that accommodate all the methods of learning, music presentation, and the utilization of environmental atmosphere well so that makes learning more fun. Quantum Learning also provides an element of effective learning in its aspects that can change the ability and natural talents of students into success in learning outcomes that benefit themselves and the environment.

In learning through a scientific approach the process of building students' understanding of the material by constructing their own understanding and emphasizing the students to learn algorithms and building problem solving skills, this is regardless of the ability of each individual different way of learning and level of ability. In the learning model with a scientific approach the questions that invite students to think about the problem solving skills are taught in the final stages of learning and are often missed due to the time in the process of constructing students' understanding longer, so the problem solving ability of students has not been maximized. In the affective side of scientific learning activities have not built Self Regulated Learning because there is no part in the scientific study in terms of providing motivation to learn to students so that students are more independent and motivated in learning mathematics, so that when students have the ability to face various problems and problems in learning mathematics.

A learning approach that is thought to improve the quality of learning and student success is Quantum Learning. One way to realize that is Quantum Learning [14]. Aspects in Quantum Learning include: Learning environment, positive attitude, learning style, note-taking technique, writing technique, memory technique, reading power, creative thinking[15]. The other factors that become successful in the learning of the attention given by the teacher in looking at the learning style of the students. With recording techniques and writing techniques that try to be applied in Quantum Learning, students are expected to be able to sort or work systematically in solving mathematical problems.

In short, in Quantum Learning students are required to think, dig, and build knowledge from their experiences with guiding questions provided by teachers. Students must solve the problem through discussion and present the solution. Teachers only facilitate, guide, and encourage enjoyable and cheerful learning. In Quantum Learning students learn according to their own way of working by using the senses, the media, or individually understanding the fun learning patterns with the working methods of each individual. The scientific approach through Quantum Learning strategy will be complementary in the learning process. So that Learning is a learning that requires students to be more active role in solving mathematical problems and build Self Regulated Learning students.

#### 4. Conclusion

Based on observation and literature study as described above, scientific learning through Quantum Learning strategy applied to the learning of mathematics in the classroom can optimize the students' learning ability so that students are able to form the ability of their problem solving and Self Regulated Learning in order to obtain optimal learning result of mathematics and they can achieve the learning objectives as desired.

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