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Improving Learning Outcomes of Linear Program with *Quantum Teaching* Model at Grade X Students SMK-BM PAB 3 Medan Estate

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Abstract

The aim of this research was to know whether the using of *Quantum Teaching* can improve students learning outcomes on linear program material. This kind of research was classroom action research that conducted in two cycles. The subjects of this research were grade X students consisted of 37 students. Technics of collecting the data included test, interview, and observation. In this research, the form of analyzing the data was descriptive analysis included data calculation, data reduction, and data interpretation. Based on the analysis result after doing the action showed the improvement mean score of the students in the first cycle was 51,3% with the mean score 64,86 (low). In the second cycle was 86,49% with the mean score 77,29 (average). Research result showed that learning with *Quantum Teaching* Model can improve students learning outcomes for linear programming material in SMK–BM PAB 3 Medan Estate.

Keywords: Learning outcomes; *quantum teaching.*

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1. Introduction

Mathematics, although it is a very important and useful lesson in life and also the progress and development of the era, Math is still an anxious lesson for students [1-5]. In this case, it makes students learning outcomes become low [5,3]. Reference [5] state that there is a significant negative correlation between students' anxiety toward mathematics and their learning outcomes. It means that students who have high anxiety level against mathematics tend to have low mathematics learning outcomes.

Another factor is from within the studentsuch as anxiety towards mathematics and also a negative view of mathematics,Low mathematics learning outcomes can also be influenced by other things such as how teachers teach, exercises are given, and others. Dimitric [6] states that there are 4 important components in learning process, they are: 1) adequacy of the student's background to a particular subject, 2) students effort to a particular subject,3) standards in teaching, testing, and evaluating, and 4) quality of teaching a particular subject.

For this time mathematics learning is still centered on the teacher [7]. Where the teachers likened to be a pot that poured knowledge to students, and the students as a media to receive all of knowledge given by the teacher. Teacher's job is to provide knowledge for students, then give examples, and ask students to do the exercises with the same procedures as the ones that have been exemplified. As the result, students' perception of mathematics is memorizing without understanding the mathematical concept itself. This misperception is what makes math a subject that is boring and difficult for students.

Preliminary study results show that learners' learning outcomes have not reached the Minimum Criteria of Mastery Learning (KKM) established by the school. This is reflected in the learning process is not interesting, the less learning process involves the role of learners to be more active learning, learners tend to be passive in the learning process, learners lack confidence in terms of expressing opinions and discussions.

Based on observations in SMK-BM PAB 3 Medan Estate showed that student learning outcomes were still low. This could be seen from the results of preliminary tests given to the students of grade X states that from 37 students who took the test only 21.62% of students who completed. In other words there were 8 students from 37 complete students. So it couldbe said that the number and criteria of mastery learning is not in accordance with what was expected. Based on the results of these observation could be concluded that the results of learning mathematics at grade X of SMK-BM PAB 3 Medan Estate were still low and not in accordance with what was expected.

In recent years many constructivism models have been developed, where the students no longer receive their knowledge from teachers, but build and develop their own knowledge. With this model of constructivism learning is expected the students are no longer just memorizing, but also understand the concept of mathematics itself.

One of the learning models offered is the *Quantum Teaching* learning model. *Quantum Teaching* is a learning model that invites students to play an active role in learning and using the basic knowledge that students have to develop their knowledge and acquire new knowledge.

According to [8], the main principle of *quantum teaching* is "Bring their world to our world, and put our world into their world". Through the *quantum teaching* model, teachers are expected to bring students into the real world by providing an understanding of the nature of science.

Through learning with the model of *Quantum Teaching* students will be invited to learn in a more comfortable and fun atmosphere, so that students will be more free to find new experiences in learning [8]. Quantum learning facilitates students to transform all opportunities into learning and make it a successful experience only through students thinking about it, and being responsible for it [8]. To make the learning process with this quantum teaching model to be really as dynamic as possible, it is necessary through the stages of *Enroll, Experience, Label, Demonstrate, Review and Celebrate under it* [8]. In Indonesia, these learning stages are often known as the framework of *quantum teaching* Tumbuhkan/*Grow*, Amati/*Observe*, Namai/*Name*, Demonstrasi/*Demonstrate*, Ulangi/*Repeat*, dan Rayakan/*Celebrate* (TANDUR).

2. Learning Outcomes

Learning outcomes are the results achieved by learners in the form of letters or numbers at the end of learning [9,10]. Learning outcomes become a learning experience for students in their behavioral changes and learning outcomes do not become a benchmark for students to study harder [11]. In addition, learning outcomes are the end result of a learning process that has been done as the understanding has been gained [12].

Learning outcomes refer to the structure of knowledge that has been created as a result of the learning process with students can solve the problem. Students learning outcomes can be influenced by the structure of knowledge that has been created, but is also influenced by a number of other factors, for example, fatigue or motivation, environmental factors in schools such as facilities, learning models, teachers [13].

Learning outcomes can show graduates from certain institutions that are believed to be the best graduates and able to carry out learning well [13]. In addition, Learning outcomes can act as a benchmark to ensure quality in education so as to reveal wider education [11].

Based on the above explanation that the learning outcome is a change in student behavior that occurs based on the learning experience and the ability of students in fulfilling a stage of achievement of learning experiences in a basic competence. Learning outcomes serve as guidance on behavioral changes that will be achieved by students in relation to learning activities undertaken. Learning outcomes can take the form of knowledge, skills and attitudes.

Based on Bloom's Taxonomy on the design of curriculum-based learning outcomes around the world that learning outcomes are divided into three main domains: Cognitive, Affective, and Psychomotor [14]. The main objective in Bloom's taxonomy of the design of learners' learning outcomes is to equip students in achieving these three major classifications or domains [15]. There are many that can affect results in learning such as the quality of teaching, the environment, the learning facilities, the methods, the models in learning, the satisfaction of learning [16,17].

3. Quantum Teaching Learning Model

The learning model is a learning design in the learning process [18] which is an important role in the learning process to be a direction of learning and concepts in learning [19].

Level of learning model plan consists of two levels: the development of learning models that can upgrade students' understanding and creativity and Level of development of study materials more relevant to the competence of graduates, including in the scoring process and study results, in accordance with the curriculum provided by the institution [20].

The world view of the quantum that characterizes the universe as a dynamic life, subjective, and provides a conceptual foundation to improve their capacity in learning. So there are several skills in the quantum model: The ability to think paradoxically, the ability to act and be responsible, the ability to believe in oneself, the ability to be in the social environment [21].

Quantum Teaching learning model is based on various theories such as *Accelerated Learning, Multiple Intelligences, Neuro-Linguistic Programing, Experiental Learning, Cooperative Learning and Elective Effective of Instruction* [8].

Quantum Teaching is a learning model that can divide learning elements into two categories such as context and content [20]. Context categories include: mood, atmosphere of a well-regulated learning environment, basic learning, presentations and facilities. While the content categories include: teachers will discover the skills of how to say the curriculum, the learner will find the learning strategies needed by learners, they are: good presentations, dynamic facilities, learning skills for learning and life skills [22,23].

The Quantum Teaching learning model is a learning process by providing backgrounds and strategies to improve learning and make the process more enjoyable [24]. This procedure provides a teaching style by empowering students to make students more successful [25]. It also helps teachers to enlarge their teaching skills and motivate students to become active in learning, so that teachers get greater satisfaction from their works [25,24].

The overall of *Quantum Teaching* Model covers both the theory of education and the action in the class accurately. This model illustrates the best practice of the best integrated research in education with the whole that makes the content of learning more meaningful and relevant to student life [8.25] thus, in can provide a learning experience to students [26].

The *Quantum Teaching* Model has a design framework known as TANDUR abbreviation which means: Grow (plant to grow), Natural (Experience/live), Name (giving name) Demonstrate (show), Repeat (R) and Celebrate [19].

This model has several principles in learning that is: Everything talks, Everything aims, Experience before naming, Acknowledge every effort, if worthy of learning then it is worth also celebrated. Thus, in the learning

process teachers make students more active in learning, making students bold in expressing opinions that will make many students to achieve the desired achievement [8].

Based on the above explanation can be concluded that the learning model *Quantum Teaching* can improve learning outcomes because this model uses the principle of suggestion that is certain and can affect the results of learning.

In addition, this model emphasizes students' creativity in the learning process, students are more active in the learning process, students can develop a theory or understanding they have. Students are required to be more confident to express an opinion.

4. Methods

This research was conducted at SMK-BM PAB 3 Medan Estate and the time of research was conducted in the second semester of academic year 2014/2015.

Subjects of this research were 1 class out of 2 classes, it was class X-PK consisted of 37 students. This type of research is *Classroom Action Research* which aims to improve the learning situation to be better by using the measures in an attempt to determine whether the application of *Quantum Teaching* model can improve student learning outcomes.

The data collection tools were obtained from test results, interviews and observation. Data analysis techniques performed in several stages of data processing, data reduction and data interpretation.

5. Result

Based on the results of observations of learning and test results of mathematics learning given to students obtained that the students' learning outcomes on linear program materials have increased.

From the data analysis that has been done, it was found that the researcher has been able to improve the learning process by using *Quantum Teaching* model. This was based on the results of observation of the implementation of learning that increased from cycle I to cycle II. Implementation of learning based on observation results for teachers in cycle I of 2.4 increased in cycle II to 3.05.

Based on the results of student learning outcomes in cycle I and cycle II, students' ability in solving the tests has increased. These results can be seen from:

1. Increasing the average grade values obtained by students.

The average gradein the first test of 52,22 increased by 12,64 to 64,86 in the first cycle study result test and increased again by 12,43 to 77,29 on the test of learning cycle II. More details can be seen in the following diagram:

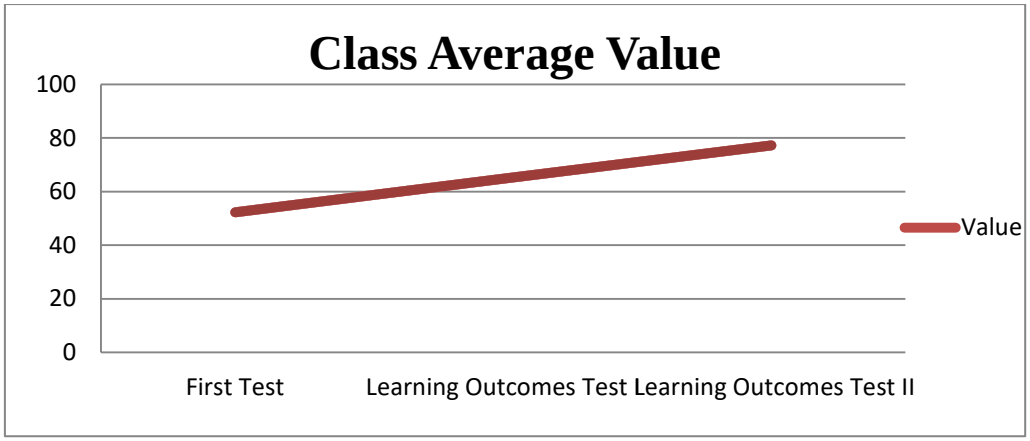

Figure 1: Description of Increase of Class Average Value In Cycle I and Cycle II

While the comparison of student mastery levels from cycle I and cycle II can be seen in the following table:

Table 1: Level of Students' Mastery in Cycle I and Cycle II

Category	Score Interval	Learning Outcomes Test I	Learning Outcomes Test II
Very Low	0 ≤ score < 55	6	2
Low	55≤ score< 65	8	2
Average	65≤ score <80	14	17
High	80≤ score <90	6	11
Very High	90≤ score< 100	3	5

From the table above can be seen that the student's mastery level is also relatively increased from cycle I to cycle II.

2. Increasing the number of students who achieved complete learning in completing test results of the learning results.

In the first test there were only 8 people or 21.62% of students who achieved mastery learning, but in the first cycle increased to 19 people or 51.35% of students have achieved mastery learning. it means that from the first test up to the test results of learning cycle I increased by 11 students who have reached completeness of learning, and in the second cycle increased again to 32 people or 86.49% of students, it means that from cycle I to cycle II increased by 13 students who have achieved mastery learning.

More details can be seen in the table below:

Table 2: Comparison of Scores of Students Learning Outcomes Test in Cycle I and Cycle II

Category	Learning Outcomes Test I		Learning Outcomes Test II		Note
	Students	Percentage	Students	Percentage	
Completed (Value ≥ 70)	19	51,35%	32	86,49%	Increased 35,14%
Incompleted (Value< 70)	18	48,65%	5	13,51%	Decreased 35,14%

From the description above, it could be concluded that the application of *Quantum Teaching* model has succeeded in improving student learning outcomes X-PK SMK-BM PAB 3 Medan Estate.

6. Discussions

Some researches related to the use of *Quantum Teaching* model have been done, among others research by [28]. Research shows that there is an increase in student activity and achievement through the application of *Quantum Teaching* model in learning the quadranglesat grade VII students of SMP Pancasila Canggu.

Relevant research by [29] stated, it can be concluded that: (1) quantum learning is effective to teach Mathematics on the topic of linear program; and (2) the learning achievement of students taught with quantum method is better than that of conventional method. With this, the researchers recommend that quantum learning be used to teach other topic because the method attract students' interests due to their experiencing and constructing knowledge with their own modes, which in turn improve their achievement.

Learning theory that underlies learning with *Quantum Teaching* model that is learning theory of Gestalt and Ausubel. Gestalt is a learning for insightful learning rather than memorizing but developing its logical thinking ability and Ausubel's theory emphasizes meaningful learning. Both theories will be explained as follows.

According to Gestalt theory [27] a person acquires knowledge through sensation or information by looking at the structure thoroughly then rearranging it in a simple structure so that it is more easily to be understood. Understanding a person depends on: the ability, experience, level of complexity of a situation, practice and Trial and error. Meanwhile, the core of Ausubel's theory is learning to be meaningful. According to Ausubel, meaningful learning is a process of linking new information to relevant concepts contained in a person's cognitive structure. In the learning process students construct what they learn themselves. This theory is very close to constructivism which emphasizes the importance of students associating new experiences, phenomena, and facts into the systems of understanding they have.

7. Conclusions

From the results and discussion can be concluded that applying the steps of *Quantum Teaching* model in teaching and learning activities can improve student learning outcomes at grade X SMK-BM PAB 3 Medan Estate in linear program materials. Based on the results of the test given to students in the first cycle obtained an average value of 64.86 and increased in cycle II to 77.29 so as to obtain an average increase in student mastery level of 12.43. In addition, the students' learning achievement was increased from 19 students (51.35%) in the first cycle increased to 32 students (86.49%) in cycle II. Thus it can be said that the class has been thoroughly studied, because ≥ 85% of students who have average mastery level.

8. Suggestions

Some suggesstions that can be submitted from the results of this study are:

1. To mathematics teacher is expected to apply student-centered model that improve students interest, one of them is by applying *Quantum Teaching* model and is expected to always conduct evaluation and reflection at the end of learning that has been done.
2. To the students are expected to be more active in the learning process, more practice to solve problems and more courageous in asking or expressing their opinions in the discussion.
3. For advanced researchers who want to do similar research, it is advisable to pay attention to the weaknesses that exist in the researcher so that the research will be done better.

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