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by I Wayan Eka Mahendra

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HOTS-Speed Test Integrated Quantum Learning Model: Can Improve Mathematical Concept Mastery?

I Wayan Eka Mahendra
Applied Development Planning and Tourism Study Program,
Institut Pariwisata dan Bisnis Internasional
Bali, Indonesia
*Correspondence author: ekamahendra@ipb-intl.ac.id

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Abstract:
This study aims to improve mathematics learning outcomes (MLO) through the Quantum learning model integrated HOTS-Speed test. This research is classroom action research (CAR). The subjects of this study were 40 students of class XI Jasa Boga 1 SMK Pariwisata Harapan Denpasar for the academic year 2020/2021. This research was conducted in 2 cycles, where at the end of each cycle students were given an MLO test. The data collected in the next cycle was analyzed descriptively to calculate the average MLO score with a minimum success indicator of 75% minimum completeness criteria. From the analysis results obtained, the average score in the first cycle did not meet the indicators of success, while in the second cycle it had fulfilled so that the research was stopped in cycle 2. The conclusion of this study was that there was an increase in HBM through the application of the HOTS-Speed test integrated Quantum learning model. The increase in MLO occurs through changes in learning that researchers do. The HOTS-Speed test integrated Quantum learning model was able to improve students' MLO. Thus, the Quantum learning model assisted HOTS-Speed test is one solution in improving MLO.

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Introduction

Education is a main foundation in the development and progress of a nation. Therefore, education problem should be a concern for all the nation's elements. Improving the education quality needs various attempts, in the micro level, one of the things that can began from choosing the right learning model. The learning that teacher does in the class is really determine the students' success in learning. There are a lot of things that can be a consideration in choosing the right learning model, among others are: students' characteristic, teaching material characteristic, or the problem that the students face. Generally, the low of the students' learning outcomes, especially in mathematics is a main problem in almost all the school.

The international research result that is done by PISA shows the less satisfactory result. Indonesian students' mathematical ability is at rank 73 with the score 379 and science ability is at rank 71 with the score 396 from 79 PISA's participant countries. This score is below the PISA's participant average score for mathematic and science, which is 489 (Mansur, 2018; Hewi and Shaleh, 2020; Liestari and Muhardis, 2020). Beside of the international research, some national researches are also done that show the low of the students' learning outcomes so far, whether from elementary school until senior high school (Ardila and Hartanto, 2017; Hevriansyah and Megawanti, 2017; Nabillah and Abadi, 2020; Riyanti, Wahyudi, and Suhartono, 2021). Some factors that cause it are the low of motivation, the activity is not maximum, the students' boredom is high, and also some other factors that have been revealed by some researches such as the choosing of the learning model that is less right.

The same thing occurs in the 11th Jasa Boga 1 at SMK Pariwisata Harapan Denpasar. The students seem less motivated in learning. They often silent when the teacher asks something or around 80% of the students do not answer it, even the students often yawning while learning mathematic subject. When the teacher asks to certain students, why would they did not ask, have they understood? The students' answer is they do not know what should be asked. They are confused with a lot of the formula and when it is used in answering the question or in solving the daily life problems that relate to mathematic. This finding shows that there is ineffective learning. The learning seems still dominated by the teacher (teacher centered). The teacher still explains without including the students in learning maximally. The delivered material by the teacher in the class is still theoretically, while the level is still LOTS (Lower Order Thinking Skills). This material is less interesting, seems monotone and less challenging for the students. These problems end up to the low of the students' mathematic learning outcomes. It is proved by the score of mathematic daily test during the limited face-to-face learning (PTM), almost 70% students get the score below the minimum completeness criteria (KKM).

This condition surely needs the solution that needed immediately. One of the solutions that can be done is with implementing the Quantum learning model. The Quantum learning model is one of the models that can improve the students' activeness. The students' activeness can raise the fun, comfort and give the learning success probability is

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bigger (Kusuma, Gunarhadi, and Riyadi, 2018). The students are invited to learning through delivering an opinion or question. One of the aspects that can build the students' learning motivation is with relating the concept with the real world. The teacher can represent pictures or videos that relate with the discussed concept. Then, the students are asked to search the relation between the picture / video with the discussed concept. The real picture/video surely can trigger the students' interest so the learning motivation can improve. In the Quantum learning model, the students are needed to think, explore and construct the knowledge from their experience that is directed by the questions the teacher delivered (Kusno and Purwanto, 2011). So that, the Quantum learning model is not only relate to the students' learning outcomes, but also impacts to the students' attitude and activeness (Acat and Yusuf, 2014).

Beside of the implementation of the learning model in the class, the other important thing to be concerned is the evaluation. The evaluation, especially in the cognitive domain, is the center from the learning process and should be done accurately and appropriate with the subject that will be measured (Widyaningsih, et al., 2021; Serevina, Sari and Maynastiti, 2019). One of the evaluation instruments that can be integrated in the Quantum learning is HOTS-speed test. The choosing of the right instrument should fulfill the substance, construction, and language requirements, and has the empiric validity (Erfianti, Istiyono, and Kuswanto, 2019). The using of HOTS item in the test instrument allows the students to improve the ability that is in line with the 21st century's needs (Hamdi, Suganda, and Hayati, 2018). One of the abilities that needed in the 21st century is the critical thinking ability. The educational researcher explains that to learn the critical thinking is not directly to learn the material, but to learn how to relate the critical thinking in self effectively (Sagala, and Andriani, 2019).

Some of the researches show the advantage of the Quantum learning than the conventional learning. Cahyaningrum, Yahya, and Asyhari (2019); Muhammawan (2021) find that the Quantum learning model is better than the conventional learning in its impact to mathematic learning outcomes. The same thing is stated the other researchers, that the Quantum learning model is better than the conventional learning in improving the students' mathematical reasoning (Yosefa and Nurjanah, 2013), improving mathematical problem solving (Riati and Farida, 2017), and improving mathematical critical thinking ability (Santoso, 2016). The research results above use the experimental research design, while in this research will use classroom action research design (*Penelitian Tindakan Kelas – PTK*).

The research problem in this research is can the implementation of Quantum learning model improve the students of XI Jasa Boga 1 class at SMK Pariwisata Harapan Denpasar year 2020/2021's mathematic learning outcomes? While the research purpose is to know the implementation of the Quantum learning model in improving the students of XI Jasa Boga 1 class at SMK Pariwisata Harapan Denpasar year 2020/2021's mathematic learning outcomes. The research success indicator is minimum at 75% students of XI Jasa Boga 1 class at SMK Pariwisata Harapan Denpasar have mathematic score above

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the minimum completeness criteria (KKM) which is 73.

The Quantum learning model is the fun learning model with the interaction between the teacher and the students that intertwined well (Malik and Afandi, 2020). This learning model helps the teacher to create the effective learning environment by using the elements to the students, such as the students' curiosity and the learning environment with the interaction in the class (Murnawan, 2021). The Quantum learning can build the students' learning interest by relating the learning material (content) with the daily life (context), beside of this model, interacting all the component in the class and the school environment to be designed in such a way all the talking topics and aims to the students' matters, so that the students can develop themselves and their knowledges (Arianti & Herwandi, 2018). The Quantum learning implementation can make the fun learning atmosphere in learning so the students can get the more maximum learning outcomes.

The Quantum learning model is a new way that ease the learning process, that combine art element and directed achievement, to various subjects. The Quantum learning has a philosophy that the teaching and learning process will success effectively, if the learning activity is done pleasantly (Riati and Farida, 2017). Moreover, it is said that the Quantum learning model concept in the learning are: a) the learning environment arrangement, b) the appreciation in learning, c) make a habit to read, d) make a habit to write, e) freeing the students' learning style, f) make the students be more creative, g) building a winner attitude, and h) practice the students' motor strength. Dewi and Yarman (2019) state that the Quantum learning can improve the students' mathematical communication skill. The same thing is stated by Nirwana (2017) that the Quantum learning can improve the students' learning activity.

Research Method

This research was the classroom action research. The purpose of the research was to improve the students' mathematic learning outcomes by implementing the Quantum learning model. This research was done at SMK Pariwisata Harapan Denpasar that located at Raya Sesetan street, No.62, Sesetan, South Denpasar, Denpasar City, Bali. The classroom-action was done in the process that consist of 2 cycles, it was done because the time limited and the researched material, beside of that, from these 2 cycles, the improvement of the students' mathematical concept mastery has seen. Each cycle consists of four phases, which were: (1) planning; (2) action; (3) observation or evaluation; (4) reflection. The research subject were 40 students of XI Jasa Boga 1 class. This research was done in the even semester year 2020/2021, where the cycle 1 consists of 5 meetings with 4 limited face-to-face of learning mathematic and 1 meeting to do the observation or evaluation. The same thing was also done in the cycle 2, so that all the meetings in this research was 10 meetings. The research object that taken in this research was the mathematic learning outcomes. Steps of collected data showed on Figure 1.

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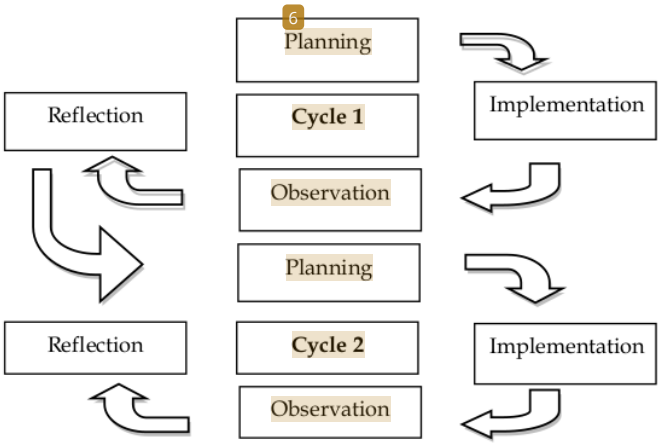

Figure 1. The Classroom Action Research Cycle

The collected data in this research was the students' mathematic learning outcomes data. The data was collected with the students' mathematic learning outcomes that was arranged by the researcher based on the material that the students had learned, next the analysis was done descriptively. The students' mathematic learning outcomes average was related to the success indicator to conclude whether to stop or continue the research to the next cycle.

Findin and Discussion

Based on the observation result, the daily implementation of learning process in the class XI Jasa Boga 1 at SMK Pariwisata Harapan Denpasar had been going well and appropriate as what the teacher planned. However, based on the daily test result, it was obtained that was not very satisfaction, where the mathematic learning outcomes average was below 65%. To be more convince of this, before the cycle I began (pre-cycle), the researcher did a pre-test first. It was done to know the students' initial knowledge. The data analysis result for the mathematic learning outcomes (*Hasil Belajar Matematika* – HBM) data in the fist observation, cycle I and cycle II phases is shown on the Table 1, as follows.

Table 1. Mathematic Learning Outcome (HBM / MLO) Data on the First Observation, Cycle I and Cycle II Phases

	First observation	Cycle I	Cycle II
Learning outcomes average	60.25	65.00	77.50
The improvement scale	-	4.75	12.5
The improvement percentage	-	7.88	19.23

To see the improvement of MLO average clearly, the result of the table above can be seen in Figure 2.

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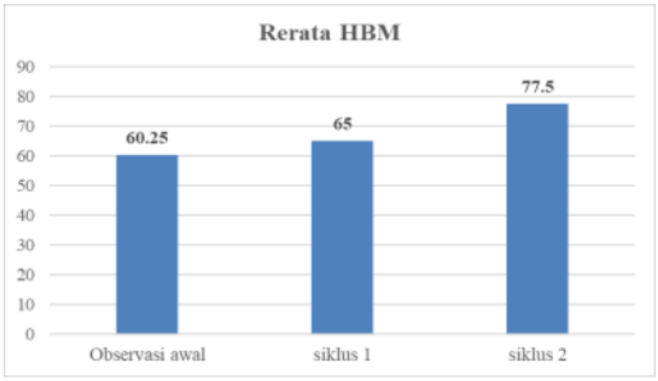

Figure 2. The Students' Mathematic Learning Outcomes Average Improvement

From the recapitulation result on the table above, it is seen that the improvement of MLO from each cycle. In the cycle I, there was an improvement of 4,75 or 7,88% if compared to the MLO average in the first observation. One of the factors that impacting the improvement was the learning process corrective. Before the research was done, the students learned with the conventional learning model, where the teacher was still dominated and the students were still passive. This learning gave several impacts, among others were (1) the learning was dominated by the teacher, so the students tend to be passive, (2) the learning emphasized on the memorization, with the lack of building concept, (3) the teacher's evaluation questions were still LOTS (lower order thinking skills), so that the higher order thinking skills was not maximum that caused the low of the students' MLO.

Based on the first observation result, the solution that was done was with implementing the Quantum learning model with HOTS-Speedtest assistance. The changes that occur in the cycle I, among others were: (1) the students began to be able to deliver their opinion. Some of the students were able to deliver their group's discussion result. The thing that the teacher did to make the students did that was by asking the group's representation to presented their discussion result; (2) the approach that the teacher did in the learning process had begins to build the concept understanding, (3) the teacher began to learn to use the instrument with the higher cognitive level. Some of the changes that occur in the learning process in the class apparently could improve the students' MLO, even though it still could not fulfill the success criteria. It was because some problems that still occur in the cycle I, which were: (1) some students did not fully understand about the teamwork concept, (2) some students were not used with HOTS instrument. The students were still adjusting with the prepared HOTS instrument by the teacher, and (3) the students still need time to fully understand the concept.

Some problems that occur in the cycle I were made as a reflection to the cycle II activity implementation. Based in the problems that had been stated in the cycle II, the improvements that made in the cycle II, were: (1) the teacher determined the groups' sitting position and formed the groups in the previous

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meeting, 2) the students got familiarized with HOTS question to work on during the practice, break time, or at house, and 3) the teacher fully emphasized the material that the students learned during the reflection before the meeting is over. The improvements that were done in the cycle 2 could improve the students' MLO to 19,23% with the average score of 77,50 and fulfilled the success indicator. The achievements in the cycle 2, were: (1) the students had been active in the learning process. The students who passive at first, start to be active to ask even able to presented and delivered an opinion during the learning process; (2) the students changed the paradigm from memorization to understanding. The students who at first only memorizing the formula, develop to asking the understanding from the concept that was taught and how to applicate it.

The Quantum learning model wit HOTS-Speedtest assistance apparently could improve the students' MLO. The Quantum learning model is the learning model that emphasizes to the students' activeness and relating it to the students' daily life. It eases the students to remember and understand the taught concept. Relating with the real world is one of the efforts to decreasing the abstraction level of mathematic concept. It is same with the research result by Yanto (2018) which is QL model can improve the students' mathematical concept understanding. The Quantum learning model is the learning model which can improve the students' learning activity. It is supported by the research from Jayantika, Parmithi, and Dyanawati (2019) which conclude that the Quantum learning model is one of the solutions in improving the students' learning activity.

The learning started with giving a pictures and videos that relate to the discussed concept. Next, the teacher is relating the presented picture/video with the discussed concept. This stage is done to improve the students' motivation and curiosity. In this research, the students seem enthusiast with the learning process. It becomes a good step to start the next learning. This research result is supported by the research that was done by Kusuma, Gunarhadi, and Riyadi (2018), which also has the same conclusion, where HOTS evaluation instrument is one of the alternatives for the teacher to practice and develop the high order thinking skills.

Relating the learning with the daily life especially in mathematic learning can add the students' knowledge in mathematic learning (Dyah et al., 2018). The students who feel difficult to learn mathematic can learn with understanding the material from the videos or pictures that the teacher gave. The used of Quantum Learning brought the students learning well and understand the concept so they can improve the learning outcomes. The students who are passive will be raised with using the Quantum learning. The students build the concept slowly and able to build the concept correctly. Building the right concept from the students who were difficult in learning to be effective and easier in learning mathematic.

The concept that built correctly can improve the students' ability in answer a question. The question that characterized Low Order Thinking can be improved to the High Order Thinking (Riyanti, et al., 2019). The students learn well the thing that is learned and can be improved during answering HOTS

question (Sagala and Adriani, 2019). The students who have difficulty in answering HOTS question will develop the skill that the teacher had been give during teaching. The teacher's role with the Quantum learning gives the concept signs in mathematic learning (Ariyamti et al., 2019). So, it helps the students learn after the signs are given in the quantum learning.

Conclusion

The research that was done categorized as classroom-action research which was done in 2 cycles, with the purpose to improve the students' mathematic learning outcomes through the QL model. From the data analysis result, the students' mathematic learning outcomes was improved from 7,88% in the cycle I to 19,23% in the cycle II which indicate that the Quantum learning model implementation could improve MLO. From this result, it can be concluded that the Quantum learning model is one of the solutions to improve MLO. The other schools who have the same problem can use the Quantum learning model to solve the problem.

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