The Effect of Learning Model Quantum Learning to Improve the Learning Outcomes of Cognitive and Metacognitive Ability of Virus Concepts in the Students of Class X_{MIA1} State Senior High School 10 Ambon

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Abstract  
This study aims to know the increase in learning outcomes and metacognitive ability of state senior high school students 10 ambon through the application of quantum learning model. The subjects of the study were students of class X_{MIA1} with a total of 23 students. This type of research is a comparative study to compare learning outcomes and metacognitive abilities of students before and after using the model of quantum learning. The data collection technique are: (1) preparing the learning device, (2) test the research instrument. Testing is done in other classes not related to the research class. (3) do the initial test (pre test), (4) carry out activities in accordance with the syntax of quantum learning, (5) do a final test (post test). The results showed that there were differences in cognitive learning outcomes and metacognitive ability before and after the application of Quantum Learning.

Keywords: Quantum Learning, Learning Outcomes of Cognitive, Metacognitive Ability

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Introduction  
Learning model of quantum learning is one of the model or philosophy of learning that has been proven effective applied in school. Another term that is almost interchangeable with quantum learning is accelerated learning. The acceleration of learning is defined as "enabling students to learn at an impressive pace, with normal effort, and accompanied by excitement" (De Porter and Hernacki, 2007). Applying Quantum Learning methods include specific instructions to create an effective learning environment, conveying the learning process, and facilitate the learning process. Through the application of Quantum Learning method is expected to increase students' metacognitive ability that can improve cognitive learning outcomes of students.

Learning outcomes are changes in student behavior due to learning. Behavior changes are caused by achieving mastery over a number of materials provided in the teaching and learning process. The achievement is based on the purpose of the pre-determined teaching. The result can be a change in the cognitive, affective and psychomotor aspects (Purwanto, 2011). One of the learning outcomes that is closely related to metacognitive ability is the result of cognitive learning. Knowledge of metacognitive ability can be known when one is aware of its cognitive abilities, then that knowledge is used to control cognitive processes.

Metacognitive is a form of the ability to see on its own, so that what is done can be controlled optimally with this ability, a person may have a high ability in solving problems (Husamah and Seyaningrum, 2013). An effort to empower the metacognitive ability of students in order to have an impact on improving students' own learning outcomes is through the use of innovative learning models. One of the learning model that implemented is the learning model of Quantum Learning.

Based on a survey conducted at SMA Negeri 10 Ambon, it is known that one of the materials taught in class XMIA1 is the concept of virus. During this time the concept of virus is taught by teachers using various models of cooperative learning, but the model of learning Quantum Learning has not been used by teachers in biology learning. Whereas the learning model of quantum learning provides effective learning with a pleasant learning atmosphere so that it can support students' mindset to manage students' cognitive during learning, so that students can get good cognitive learning outcomes. This is reinforced by the opinion of Fajrin, et al. (2014) who argued that the learning of quantum learning is a model of learning that implements various forms of
interaction and the creation of a festive atmosphere to arouse interest in learning for students. The purpose of
this research is to know the difference of cognitive learning outcomes and metacognitive ability before and after
implemented the model of learning of Quantum Learning on Virus Material on X\textsubscript{MIA1} Student Class SMA N 10
Ambon.

Method
This research is a comparative research that aims to compare the average score of cognitive learning
outcomes and metacognitive ability of students before and after implemented learning model Quantum Learning
Virus concept on student of Class XMIA1 SMA N 10 Ambon.

Population in this research that is all student of class X SMA N 10 Ambon. The sample in this research
is all students of XMIA1 SMA N 10 Ambon class, which is 23 students. Data collection was done by test and
non test technique. The data obtained in this research is the data implementation of learning model of Quantum
Learning obtained through questionnaires and filled out by students, data cognitive learning outcomes and
metacognitive ability data.

The instrument used in this research is the observation sheet of instructional model of learning Quantum
Learning, essay test using metacognitive rubrics developed by Corebima. Data analysis was done descriptively
qualitative and inferential. Qualitative descriptive is used to analyze data of the implementation of learning
model of Quantum Learning in the form of percentage and shown in table. Inferential analysis is used to analyze
data of cognitive learning outcomes and metacognitive ability of students using t-test. T-test analysis using SPSS
18.0 for Windows software. Data on cognitive learning outcomes and metacognitive ability were previously
analyzed in advance of homogeneity and normality of data. This is done to know the data comes from a
homogeneous and normally distributed population. The learning instrument prior to use has been validated first,
so it is declared eligible for use in the study.

Results and Discussion
The results of the implementation of Learning Quantum Learning model by the students are shown in
Table 1.

Table 1. Results of Implementation of Learning Models of Quantum Learning Model

<table>
<thead>
<tr>
<th>Description of Learning Stage</th>
<th>Meeting I</th>
<th>Meeting II</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Performance (%)</td>
<td>Category</td>
</tr>
<tr>
<td>Grow</td>
<td>59.42</td>
<td>Enough</td>
</tr>
<tr>
<td>Natural</td>
<td>82.61</td>
<td>Good</td>
</tr>
<tr>
<td>Name it</td>
<td>100</td>
<td>Very Good</td>
</tr>
<tr>
<td>Demonstrate</td>
<td>58.70</td>
<td>Enough</td>
</tr>
<tr>
<td>Repeat</td>
<td>52.17</td>
<td>Enough</td>
</tr>
<tr>
<td>Celebrate</td>
<td>73.91</td>
<td>Good</td>
</tr>
</tbody>
</table>

The findings gained during applying the learning model of Quantum Learning at meeting I, it is known
that the implementation of the learning phase of Quantum Learning is in the category of enough, good, and very
good. At this meeting I the implementation of learning does not run optimally. This is due to the lack of time
management so that the teacher's role as a motivator is not well implemented, and the students' opportunities to
demonstrate knowledge and experience and repeat the material are not implemented by all students. The
consequence is that students who have not had the opportunity to demonstrate and repeat the material feel
disappointed and react by giving the choice of 'no' answers in the questionnaire of learning implementation. At
the second meeting, teachers had anticipated to motivate some students who had been observed in previous
meetings to receive less attention and encouragement from teachers. Another thing the teacher does is try to
provide the opportunity for most students to democratize their knowledge and experience, and to repeat the
material to the majority of the students.

The same is also stated by Mulhayatiah (2014) that the average activity of lecturers using project-based
learning strategy in each meeting increased from 70.67% to 84.83%. Dianti and Irmawan's research (2013)
showed that students' responses to the application of Quantum Learning model on BRSL material (Bangun
Ruang Si Lengkung) showed positive direction. During the learning process, the teacher's role as facilitator is
to create an atmosphere of conducive learning activities (fun), and in line with student development, the interaction
of teaching learning will take place effectively. While the role of teachers as a motivator that teachers should stimulate and give encouragement to foster activity and creativity (creativity), there will be changes in learning and learning outcomes are better.

After the cognitive and metacognitive learning outcomes have met the normality and homogeneity requirements, the paired t-tests are conducted to determine differences in cognitive and metacognitive learning outcomes before and after the application of the Quantum Learning learning model. The result of t test can be seen in Table 2.

<table>
<thead>
<tr>
<th>Paired t test</th>
<th>N</th>
<th>t-count</th>
<th>DF</th>
<th>Significant</th>
<th>Level of confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive</td>
<td>23</td>
<td>-24,429</td>
<td>22</td>
<td>0,000</td>
<td>0,05</td>
</tr>
<tr>
<td>Metacognitive</td>
<td>23</td>
<td>-20,380</td>
<td>22</td>
<td>0,000</td>
<td></td>
</tr>
</tbody>
</table>

The results showed that all significant values (0.000) < 0.05, so there are differences before and after the application of learning model Quantum Learning in the realm of cognitive and metacognitive learning outcomes on the concept of Virus (Table 2). The existence of differences before and after the application of learning model Quantum Learning proves that the learning model of Quantum Learning can improve the metacognitive ability and also the cognitive learning outcomes. The effectiveness of Quantum Learning learning model is not separated from the learning stages of TANDUR-based Quantum Learning.

Growing Stages, through this stage the teacher builds student interest for the concept of the virus, the teacher attracts students' attention, so hearing the word virus, then the students are interested in studying this concept. This is because the teacher gives understanding that everyday students are oriented with the virus in the sense both (have benefits) and viruses as the cause of disease. Prasetyo, et al. (2012) states that the aspect of interest creation is one of the aspects that determine the success of biology learning. The principle of this Growing stage is to bring the concept of the virus into the world of students, so that students experience contextual learning. Adityarini, et al. (2013) reported his research that there is an increase of cognitive aspect learning outcomes in animalia material through the application of Quantum Learning model with Flashcard media aid then there was an increase of 2.8% from 77.24% in cycle I to 80.05% in cycle II.

Through the Natural Stage, students are brought into the viral material situation to recognize the characteristics and structure of the virus, the reproduction and grouping of viruses, roles and causes of the virus in various diseases. During this natural process metacognitive ability is also honed to increase. According to Listiana, et al. (2014) learning using conventional strategies during biology learning will decrease students' thinking and metacognitive ability. Therefore the use of Quantum Learning learning model is already suitable to be applied as one model of cooperative learning that can empower the metacognitive ability of students and students' cognitive learning outcomes. Empowering metacognitive abilities during the learning process can help students realize their cognitive abilities, and then cognitive knowledge can be used to control students' cognitive processes. empowering students cognitively is essential at this Natural stage. Corebima (2010) asserts that the lack of empowerment of students 'thinking skills during the learning process can cause students' cognitive learning outcomes to be low.

The next stage is the stage Namai, through this stage students are facilitated to provide a name or term to the concept that has been studied in the previous stage. Stages Namai, students will transform the knowledge gained in the previous stage into a term for use in this activity. Bruner (1960) in Safryadi et al. (2013) states that cognitive learning involves three simultaneous processes of acquiring new information, transforming information and testing the relevance and precision of knowledge. Through the transformation of knowledge that has been obtained then students to assess the process, characteristics / diseases caused by virus infection better. During this process of knowledge / information transformation metacognitive abilities are indispensable. Efklides (2006) states that metacognition is an important part of learning. Yusaha et al (2017) adds that students who have good metacognition during the learning process will become independent learners.

The next stage is the Demonstration stage, the demonstration stage is a constructivist stage that helps students build their cognitive process. Muhfahroyin (2007) states that the metacognition process will activate and direct the flow of information during learning. Saragih and Kristiani (0000) explained that at this stage the teacher gives students the opportunity to demonstrate and practice the material they have just learned.

The next stage is the Repeat phase, at this stage students are required to repeat the material. At this stage of Repeat, metacognitive ability is very important to be sharpened and developed. Students with good metacognitive will be able to repeat viral material well. Young and Fry (2008) assert that metacognition is a sign
of activity to monitor and control a person's cognitive, further explained that metacognitive knowledge can explain what we know about cognitive processes. The deepening of the material through the process of repeating by drawing conclusions and celebrating the student's business results is a feedback as a teacher reference to know the students have experienced learning. Stages Celebrate for the work of students is also an activity that is able to maintain interest in learning which ultimately improve the cognitive process of students.

Conclusion

Based on the result of the research, it is concluded that the effect of learning model Quantum Learning improves learning outcomes of cognitive and metacognitive ability of Class X MIA1 State Senior High School 10 Ambon. This is evidenced by the students have been able to TANDUR of Quantum Learning.

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Reference


