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THE USE OF QUANTUM TEACHING MODELS ON EQUILIBRUM CHEMISTRY FOR ELEVEN-GRADE STUDENTS IN SENIOR HIGH SCHOOLS OF 14 PALEMBANG

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Abstract

The purpose of this research is to determine the use of quantum teaching models on equilibrium chemistry to improve chemistry learning process in senior high schools 14 of Palembang. The quantum teaching model is one of the guidelines in planning and implementing learning that can improve the teaching and learning process in a class consisted of six phase *i.e* Grow, Natural, Name, Demonstrate, Repeat and Celebrate. The subject of this research was 40 eleven-grade students. This research was conducted for 3 cycles. The averages of students learning outcomes before treatment (T_0) was 51.82 with percentage of learning completeness was 10%. The average of students' learning outcomes in first cycle (T_1) was 68.4 with percentage of learning completeness was 47.37%. The average of students learning outcomes in the second cycle (T_2) was 78.9 with the percentage of learning completeness was 78.9%. The average of the students' learning outcomes in the third cycle (T_3) was 84.4 with the percentage of learning completeness was 86.84%. Based on observe to students activity, quantum teaching can improve students activity, that is in the first cycle was 50.64%, the second cycle was 63.03% and 73.76% was for the third cycle.

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INTRODUCTION

Learning on chemistry subjects needs to be reviewed and evaluated. Learning is a positive process that brings benefits to students for self-growth and development (Morrice, 2012). Based on the 2013/2014 National Examination results, it can be mapped that the lowest absorption of student competency achievement is in chemistry subjects which only absorbed 59.82%. The achievement of competencies which experienced a drastic decline from 2012 to 2013 was 19.70 (from 83.7% to 64%) in elemental chemicals. Similarly, atomic structure competencies, periodic elements and chemical bonds, decreased by 19.70 (from 90.65% to 70.95%), reaction kinetic competence and chemical equilibrium (from 87.04% to 67.96%), and thermochemical competencies (Kemendikbud, 2014).

Chemical absorption in reaction kinetics competencies and chemical equilibrium from 2012 to 2014 always decreased, which were 87.04%, 67.96% and 67.80% respectively (Kemendikbud, 2014). Chemistry subjects that have the lowest absorption are caused by students being more interested in subjects that match the characteristics of students. Less desirable subjects will influence the low learning achievement of these subjects (Kemendikbud, 2014). Anies said nationally for the IPA study program, the Ministry of Education and Culture recorded the 2015 UN average score rose by 1.59 points (Linggasari, 2015). Chemistry subjects only experienced an increase of 0.38 points when compared to other subjects the chemistry subject did not experience a significant increase. The learning process must always be addressed to be able to improve the quality of education directed at gaining knowledge, skills and social values (Azeiteiro, Bacelar-Nicolau, Caetano, & Caeiro, 2015; Bano, Zowghi, Kearney, Schuck, & Aubusson, 2018). Judging from this, it is necessary to continue to improve and improve the quality of education especially in chemistry subject matter.

Based on the results of direct observation, interviews with chemistry teachers and questionnaires given to students at Palembang State High School 14, the problems that can hinder the improvement of student learning outcomes are: (1) the learning process that is still teacher-centered, (2) students are less motivated to learn chemistry in terms of questionnaires given to students as much as 49% of the total students gave a negative response to chemistry lessons, (3) students' self-confidence is still low in terms of only 25% of students who can answer teacher questions correctly, (5) position the teacher is in front of the class so that the teacher's voice is not centralized, so that students are less motivated, (6) the learning atmosphere is less enthusiastic and there has not been any clapping or thumbs up for participating students.

The minimum completeness criterion (KKM) for chemistry lessons at Palembang State High School 14 is 73. Based on the new daily test results conducted by students who reach KKM 73 as much as 10% and students who cannot reach KKM 73 as much as 90%. Based on direct observations of the grades of class XI students, their chemical values while still in class X are still categorized as low even 22.5% of students get scores under the KKM. In order for student learning outcomes to achieve success, the teacher can overcome these problems by making improvements to the teaching model, while the models used so far are teacher-centered Direct Teaching. Teachers should not be the only place to gain knowledge (Harfitt & Chow, 2018).

The results of the description of the value of the chemical UN in 2012 to 2014 can be concluded that chemistry subjects are difficult and abstract so that many students are not able to learn them (Karpin, Juuti, & Lavonen, 2014). Arends argues that the learning model is a plan or pattern prepared to help students learn more specifically about various sciences, attitudes and skills (Arends, 2008). With the usual learning model, students are found to be bored, not interested, and sometimes not even sure why they are learning about a topic (Azeiteiro et al., 2015; Bano et al., 2018; Bhattacharjee, Paul, Hong, & Karthigaikumar, 2017). The last few years a new teaching approach has been developed through learning models to update and improve student competence (Harfitt & Chow, 2018; Perini, Luglietti, Margoudi, Oliveira, & Taisch, 2018; Stull, Gainer, &

Hegarty, 2017). The selection and use of the right learning model can make the learning process more effective (Bhattacharjee et al., 2017; Fuhrmann, Schneider, & Blikstein, 2018; Justi & Gilbert, 2010). Through the right learning model students are able to understand the subject matter easily. Therefore a learning will be more effective if the teacher uses a learning model that is expected to attract students to learn.

The Quantum Teaching model is one of the learning models that can be chosen so that learning becomes effective, efficient, and enjoyable (Yaseer, Sukestiyarno, & Masrukan, 2014). Quantum Teaching or also known as Quantum learning is a learning model that has been applied in many countries and has received a lot of praise from experts. According to DePorter (2014) Quantum Teaching includes specific instructions for creating an effective learning environment, designing curriculum, delivering content, and facilitating the learning process (DePorter, Reardon, & Singer–Nourie, 2010). Quantum Teaching Model is a learning process by providing strategies to improve learning that is fun (Suryani, 2013). The learning model chosen by the teacher should be a learning model that considers interesting and successful learning (Howard, Novak, Cline, & Scott, 2014; Luna & Winters, 2017). The Quantum Teaching model is expected to make stressful chemistry learning situations become enjoyable learning so that students more easily reach the expected competencies.

The main principle of this method is "Bring Their World to Our World and Take Our World to Their World" (DePorter et al., 2010). Quantum Teaching does not only offer material that students must learn, but students are also taught how to create emotional relationships that are good in and when learning. Quantum teaching directs students to function both hemispheres of the left brain and right brain in their respective functions.

The principle of Quantum Teaching is everything to speak; everything aims; experience before naming; recognize every effort and if it is worth studying, it is also worth celebrating (DePorter et al., 2010). An explanation of the principles of Quantum Teaching is (1) everything speaks, the classroom environment, body language, and learning materials all convey messages about learning; (2) everything aims, students are told what their purpose is to learn the material to be taught; (3) experience before naming (concept), from the experience of the teacher and students there are many concepts; (4) acknowledge every effort, appreciate the smallest effort of students; (4) if it is worth studying, it is also worth celebrating, we must give praise to students who are actively involved in the lesson. For example by giving applause, saying: good !; well!; and other praise words.

The dynamic Quantum Teaching method is the TANDUR framework (Grow, Natural, Name, Demonstrate, Repeat and Celebrate) (Kusno & Purwanto, 2011). Growing means growing students' interest in learning harder. One of the problems in the class is the students' interest in chemistry learning is still low, it is expected that after applying the Quantum Teaching model can increase student interest and motivation; Natural means providing learning experiences directly to students so they will keep remembering them because they are included in the system of Long Term Memory of students (Perini et al., 2018; Stull et al., 2017); Name means providing enough information when peak interests mean problems that often occur students are given a material explanation that is integibiously confusing so that to avoid it provided keywords, concepts, models, formulas and strategies as a marker of students learning; Demonstration means providing opportunities for students to demonstrate the results of their work with this stage which is expected to increase student confidence; Repeat means repeating to reinforce students' understanding at this stage of repeating the material and emphasizing "I know that I really know this": and Celebrating means celebrating a success achieved by students in the form of applause, praise, giving gifts or applause so that the atmosphere in learning become more fun. The TANDUR framework can make students more active and make learning more meaningful because students are invited to experience it themselves. The principles and methods of Quantum Teaching keep the learning process centered on students and teachers as limited as facilitators so students can understand the concept of chemistry more effectively, efficiently and pleasantly.

The application of Quantum Teaching learning has been carried out by several researchers in various regions in Indonesia, including research conducted by Listari (2012) stating that the influence of Quantum Teaching learning is able to improve the chemistry learning outcomes of class XI Palembang 11 Senior High School students (Listari, 2012). In the Antari study (2014) stated that the application of the Quantum Teaching model can improve the activities and student achievement in cube and beam learning in class VIII SMP Negeri 2 Ubud (Antari, 2014). Based on the description and research on Quantum Teaching researchers believe that models that can overcome the problems of students at Palembang State High School 14 are fun models, attract students, and can explore further learning resources and can improve student learning outcomes, namely the Quantum Teaching model. Therefore, the researcher will try the research for class XI IPA 1 with the subject of chemical equilibrium entitled "The Use of Quantum Teaching Models on Equilibrium Chemistry for Eleven-Grade Students in Senior High Schools of 14 Palembang".

METHODS

This type of research uses Classroom Action Research (CAR). Action research is an appropriate way to overcome problems between researchers and students so as to pave the way for students to express themselves productively so as to improve students' skills and motivation (Stapleton, 2018; Tammi, 2013; Voigt, Hansen, Glindorf, Poulsen, & Willaing, 2014; Whong, Gil, & Marsden, 2014). Action research can provide valuable perspectives on classroom action research, classroom management is consistently very important for teachers to reduce the difficulty of managing classes and implementing effective actions for students (Dick, 2015; Huertas, Lopez, & Sanabria, 2016; Kolenick, 2017; Kwok, 2018). Class action research is used for investigations in exploring the potential of learning for education in the future, this study highlights pedagogical changes through changes in learning models through the cycle of classroom action research (Casey & Evans, 2017; Cunningham, 2016; Wojcik & Mondry, 2017). The study was conducted at Palembang State High School 14 which was conducted in class XI IPA 1 2016/2017 academic year designed in three cycles. Cycle I discusses dynamic equilibrium material. Cycle II discusses the material factors that affect the shift in equilibrium. Cycle III discusses the material of quantitative relations between reagents from equilibrium reactions. Each cycle consists of four stages of activity, namely: (1)planning, (2)action, (3)observation, and (4) reflection.

Planning Phase

At this planning stage several steps need to be prepared in the research in the first cycle, namely as follows: (1) Early observation and data collection on student learning outcomes. This data is used as data on student learning outcomes before action (T0). (2) Prepare and prepare a Learning Implementation Plan (RPP) sub equilibrium dynamic that refers to the steps of the Quantum Teaching model. (3) Preparing Student Worksheets (LKS). (4) Prepare an Observation Sheet. (5) Prepare the final cycle test questions in the form of a description test. (6) Prepare the answer key for the final cycle test. Then at the end of the first cycle there will be a test of learning outcomes.

Implementation Phase

The action is carried out in 3 cycles with each cycle consisting of two meetings, the stages of implementing the action are adjusted to the syntax of the Quantum Teaching model:

1) Grow
2) Natural
3) Name it
4) Demonstration
5) Repeat
6) Celebrate

Observation Phase

The implementation of classroom action research observations was carried out by researchers and 3 FKIP student colleagues as observers and Endang Ellyani, S.Pd. as a teacher partner or researcher collaborator as well as a chemistry subject teacher in class XI IPA 1 Palembang 14 High School. Observation activities are carried out using observation sheets conducted by observers. In this case the observer observes during the activity by observing the activities of the students based on the observation sheet and using a record of the facts of the activity as a supporter.

Reflection Stage

The reflection phase of the results of observations, assessments, and field notes was processed, interpreted and concluded that improvements were made in the next cycle. In addition, the results of reflection are used as a basis or guideline for improvement of action planning in the next cycle, so that weaknesses or obstacles that occur will not be repeated again in the next cycle.

RESULTS AND DISCUSSION

This Classroom Action Research (CAR) aims to improve student chemistry learning outcomes through the Quantum Teaching model in class XI IPA 1 Palembang 14 SMA in the 2016/2017 academic year, on November 15 2016 - December 1, 2016. The study consisted of three cycle and one cycle consists of two meetings. The PTK results were obtained in the form of observation data and student learning outcomes data.

Table 1. Data on Student Learning Outcomes Before Action

Score	The number of students	Tot-al	Percentage of completeness	Average Learning Outcomes
83 – 100	2	4	10 % (Complete)	
73 – 82	2			
63 – 72	2	36	90% (Not finished)	51,82
53 – 62	11			
0 – 52	23			
Total	40	40	100%	

Student learning outcomes before being given an action (T0) were obtained from students' daily test scores on the reaction rate material with a 10% percentage of learning outcomes completeness and a class average of 51.82. The total number of students who participated in the daily tests on the reaction rate material was 40 students, while students who completed or reached KKM were only 4 students and the remaining 36 students had scores far below the KKM. KKM for chemistry subjects at Palembang State High School 14 is 73.

Table 2. Data Recapitulation of Student Cycle I Learning Outcomes

Score	The number of students	Tot-al	Percentage of completeness	Average Learning Outcomes
83 – 100	2	18	47,37 % (Complete)	
73 – 82	16			
63 – 72	4	20	52,63 % (Not Finised)	68,4
53 – 62	9			
0 – 52	7			
Total	38	38	100%	

Student learning outcomes in the first cycle (T1) with a class average of 68.4 and student learning completeness of 47.37% so that in the first cycle the learning outcomes of students are still low. Of the 38 students present, the number of students who reached the completeness limit was as many as 18 people. While those who did not complete were as many as 20 people. From these data it can be concluded that learning outcomes (T1) have not reached the classical completeness limit of 85%.

Table 3. Recapitulation of Data on Student Cycle II Learning Outcomes

Score	The number of students	Tot -al	Percentage of completeness	Average Learning Outcomes
83 – 100	8	30	78,9% (Complete)	
73 – 82	22			
63 – 72	4	8	21,1% (Not Finised)	78,9
53 – 62	4			
0 – 52	0			
Total	38	38	100%	

Student learning outcomes in the second cycle (T2) with a class average of 78.9 and student learning completeness of 78.9% in the second cycle of student learning outcomes have been categorized high. Of the 38 students present, the number of students who reached the completeness limit was 30 people. Whereas 8 people did not complete. From the learning outcome data (T2), the learning outcome completeness is 78.9%, this percentage has not reached the classical completeness limit of 85% so it still needs to be continued to the next cycle.

Table 4. Recapitulation of Data on Student Learning Outcomes in Cycle III

Score	The number of students	Tot-al	Percentage of completeness	Average Learning Outcomes
83 – 100	13	33	86,84% (Complete)	84,4
73 – 82	20			
63 – 72	4	5	13,16% (Not Finised)	
53 – 62	1			
0 – 52	0			
Total	38	38	100%	

Data on student learning outcomes in the third cycle (T3) with an average grade of 84.4 and student learning completeness of 86.84% in the third cycle of the results of categorized student learning is very high. Of the 38 students who attended and there were 2 students who were not present, the number of students who reached the completeness limit was as many as 33 people. Whereas the number of students who did not complete were as many as 5 people. From these data it can be concluded that learning outcomes (T3) have reached the classical completeness limit.

Table 5. Recapitulation of Student Learning Outcomes (T_0, T_1, T_2, T_3)

Cycle	Percentage of Student Learning Completeness	Value of Average Student Learning Outcomes	Categories of achievement of Student Learning Outcomes
T_0	10%	51,82	Very low
T_1	47,37%	68,4	Low
T_2	78,9%	78,9	High
T_3	86,84%	84,4	Very high

Improving student learning outcomes can be viewed from the average student learning outcomes in one class and the percentage of student learning completeness. Based on the learning outcomes in the third cycle there was an increase from cycle II and cycle I, it can be observed in student learning outcomes in one class in the first cycle, second cycle and third cycle.

Based on the Value of Student Worksheets (LKS) from cycle I, cycle II and cycle III there is an increase in each cycle which can be reviewed in table 9 below:

Table 6. Recapitulation of Cycle I, II, and III LKS Values

Num	Group	Score LKS		
		Cycle I	Cycle II	Cycle III
1	I	70	80	85
2	II	80	80	85
3	III	65	90	95
4	IV	65	80	90
5	V	95	100	100
6	VI	85	100	90
7	VII	85	90	90
8	VIII	85	100	90
9	IX	75	80	95
Total		705	800	820
Percentage		78,33%	88,89%	91,1%

Table 7. Percentage of Student Activity (Cycle I, II, and III)

Percentage of Student Activity (Cycle I, II, and III)				
Num	Group	% Student Activity		
		Cycle I	Cycle II	Cycle III
1	I	39,58	59,37	65,62
2	II	52,08	68,75	77,08
3	III	41,66	57,29	67,70
4	IV	43,75	61,45	69,79
5	V	63,54	70,83	82,29
6	VI	53,33	61,66	70,83
7	VII	53,12	64,58	78,12
8	VIII	60,41	66,66	79,16
9	IX	48,33	56,66	73,33
	Total	455,80	567,25	663,92
	Percentage	50,64	63,03	73,76

Based on table 10, it can be concluded that the percentage of student activity in the first cycle, cycle II and cycle III always increases. Based on the collection of learning outcomes data, the percentage of mastery learning, and the activity of students in the learning process in the first cycle, second cycle, and third cycle, it can be observed in Figure 1 below:

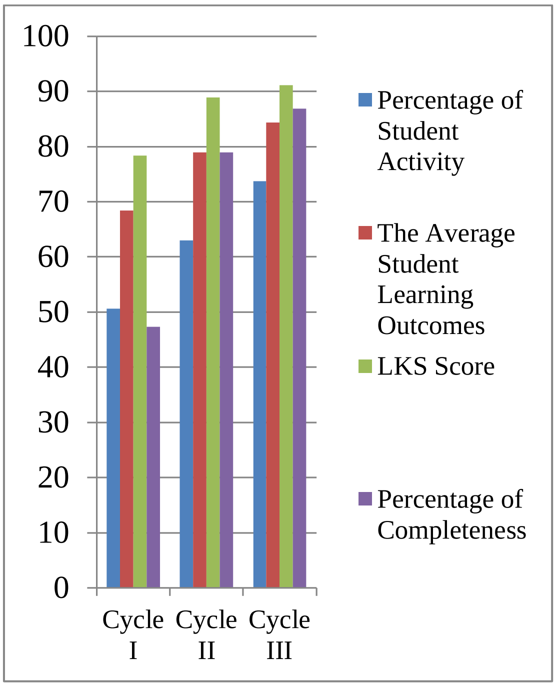

Figure 1. Bar Diagram Increased Student Activity, Average Learning Outcomes and Study Completeness

Based on the picture above, from the data on the percentage of student activity, the average student learning outcomes, the average LKS score and the percentage of student learning completeness can be concluded that student learning outcomes increase from cycle I, cycle II and cycle III.

The learning material in the first cycle is dynamic equilibrium, in the second cycle the factors that influence the shift in equilibrium, in the third cycle are the quantitative relationships between reagents from the equilibrium reaction. Based on the data obtained from the research results, there is an increase in student activity. The percentage of student activity from the first cycle was 50.64% to 63.03% in the second cycle and then increased in the third cycle to 73.76%. Increased student activity is followed by an increase in student learning outcomes that encourage student success. Active learning is a way of teaching that encourages student success in learning outcomes (Baepler, Walker, & Driessen, 2014; Freeman et al., 2014). Improved student learning outcomes in terms of class averages of 51.82 before the action increased to 68.4 in the first cycle, then in the second cycle increased to 78.9 and in the third cycle to 84.6. The percentage of students' mastery learning also increased from 10% before the action was made to 47.37% in the first cycle, then 78.9% in the second cycle and 86.84% in the third cycle. The percentage of LKS values increased every cycle, in the first cycle the average percentage of LKS was 78.33%, in the second cycle the average percentage of LKS was 88.89% and it increased also in the third cycle which was 91.1% . Improvement of student learning outcomes occurred after the action was taken in the form of the application of the Quantum Teaching model in the learning process of chemistry in class XI IPA 1 Palembang State High School 14.

Data on learning outcomes in the first cycle shows an increase in student learning outcomes. Data on student learning outcomes before action (T0) is taken from the daily test results of students' material reaction rates with a class average of 51.82 and a percentage of completeness of 10%. Student learning outcomes after action in cycle I (T1) increased to 68.4 in dynamic equilibrium material with a percentage of completeness of 47.37%. The increase that occurs in the class average is 16.58. Even though there was an increase, student learning outcomes had not yet reached the KKM score and the percentage of completeness of student learning outcomes was also still below the classical completeness limit, ie not 85% of students reached the KKM score. The percentage of LKS values in the first cycle was 78.33% and there were 3 groups whose LKS scores were not yet complete, namely groups 1, 3 and 4. This happened because there were still weaknesses in the learning process carried out. Students also have never learned by applying the Quantum Teaching model. Based on observation data obtained during the learning process, several stages of the Quantum Teaching model have not been fully implemented because most students have not studied dynamic equilibrium material that will be studied before the learning process begins so that at the growing stage students are less enthusiastic when the learning process takes place. lack of interaction between teacher and student and at the stage of demonstrating the lack of interaction among students during the learning process (King, 2012). The main hurdles in learning are the inability of students to show a good understanding of very basic concepts of matter (Ali, 2012; Davies, 2018). A series of characteristics related to the ability and resistance of students to psychological stress to increase the level of active participation of students in active class activities planned to succeed in the classroom (Bardi, Koone, Mewaldt, & O'Connor, 2011; Freguia, 2016). The teacher is involved in pedagogical design, lesson analysis, and evaluation of student learning, as well as research to build and test conceptual models of the complex linkages between student learning in science in order to adapt research results (Cano, García, Berbén, & Justicia, 2014; Vikstrom, 2014). Design and integrate chemical content, students, technology and communication tools, and assessments, thus enabling dynamic learning (Chittleborough, 2014; O'Connor, McDonald, & Ruggiero, 2015). Weaknesses that occur in the first cycle will be used as a reference for improving the implementation plan for cycle II, namely by motivating students to study the material to be taught by giving homework or the task of reading and motivating students to be actively involved in the learning process by asking teachers about material that has not been understood and motivate students to actively answer questions that the teacher asks by raising their hands.

The implementation of learning in the second cycle was carried out with improvements planned on reflection cycle I. Based on the test results of the learning cycle II, student learning outcomes increased. The class average in the second cycle is 78.9 in the material factors that affect the shift in equilibrium with the percentage of completeness of 78.9%. In the second cycle of 38 students in total, there were 8 people who had not yet reached KKM. The average student learning outcomes in the second cycle increased compared to student learning outcomes in the first cycle and had reached KKM but the percentage of completeness was still below the classical completeness limit, which was not 85% of students reached KKM. The percentage of the second cycle worksheet values increased by 88.89% before the first cycle only 78.33%. In the second cycle, the LKS value of all groups has been categorized completely, this proves that the stages in Quantum Teaching can improve student learning outcomes, proven that the Celebration stage can motivate groups that have not been active to be active so that learning outcomes increase. Improvement of student learning outcomes in the second cycle of material factors that affect the equilibrium shift occurs due to the application of the Quantum Teaching model with several corrective actions based on weaknesses found in cycle I. In cycle II students have begun to be enthusiastic in applying the Quantum Teaching model in the learning process and the learning process of students is more directed at each stage. But in the implementation of learning in cycle II there still needs to be improvement. At the stage of growing some students still lack interaction with the teacher when the learning process takes place. In the Namai stage, some students do not interact with group friends when the discussion process begins. Weaknesses in this second cycle will be corrected for planning the learning process in cycle III in order to improve student learning outcomes by motivating students to be actively involved in group discussions so students can complete group assignments together, and provide motivation to students to be active ask the teacher if there is material that has not been understood and provide motivation to students to actively answer teacher questions so as to increase interaction between students and teachers.

Learning activities by implementing the Quantum Teaching learning model in cycle III have been well implemented. Student learning outcomes in the third cycle of quantitative relations material between reagents from the equilibrium reaction showed an increase in the average class to 84.4 from the class average in the second cycle of 78.9. The percentage of completeness of student learning outcomes in the third cycle also experienced an increase of 86.84% from 78.9% in cycle II. The percentage of LKS values in the third cycle also increased by 91.1% from 88.89% in cycle II. The LKS value of all groups in the third cycle has been categorized as complete. Based on these data, student learning outcomes in the third cycle of quantitative relations material between reagents from the equilibrium reaction have reached the classical completeness limit because the percentage of completeness of learning outcomes in the third cycle has reached 85% and even more that is 86.4%.

The increase in learning outcomes is due to the application of the Quantum Teaching model with several improvements in the first cycle and second cycle. In cycle III students are able to follow the learning process using the Quantum Teaching model. The learning process of students not only accepts material concepts from the teacher but students do their own learning until finally they are able to find the concept of the material they are learning. The teacher only acts as a facilitator that helps simplify the learning process so students have the opportunity to apply their own ideas. Based on the percentage value of student activity, the average learning outcomes, the percentage of LKS scores and the percentage of completeness from cycle I to cycle III always increases, this proves that the stages of Quantum Teaching are proven to be able to improve student learning outcomes.

Table 8. Data Recapitulation of Increased Learning Outcomes, Student Worksheets, Percentage of Student Completeness and Activity

Enhancement	Cycle I	Cycle II	Cycle III
Learning outcomes	68,4	78,9	84,4
Percentage of completeness	47,37%	78,9%	86,84%
Percentage of LKS Score	78,33%	88,89%	91,1%
Percentage of Student Activity	50,64%	63,03%	73,76%

The learning process using the Quantum Teaching model can improve the learning outcomes of chemistry students in class XI IPA 1 Palembang 14 High School. Research conducted by Listari (2012) states that the influence of learning Quantum Teaching is able to improve the learning outcomes of chemistry in class XI Palembang 11 SMA. In the Antari study (2014) stated that the application of the Quantum Teaching model can improve the activities and student learning achievements in cube and beam learning in class VIII of SMP Negeri 2 Ubud. The results of this study are in line with the results of research conducted by Listari (2012) and Antari (2014) showing that the Quantum Teaching model can improve student learning outcomes on the subject of chemical equilibrium.

CONCLUSION

The Quantum Teaching model is known to increase the chemistry learning outcomes of students of class XI IPA 1 Palembang 14 High School. Increased learning outcomes in this study can be observed from the class average student learning outcomes before action (T0) of 51.82 with the percentage of completeness of learning outcomes by 10% increased in the first cycle (T1) with a class average of 68.4 student learning outcomes with the percentage of completeness of learning outcomes of 47.37% then the average class of student learning outcomes increased to 78.9 with the percentage of completeness of learning outcomes in the second cycle 78.9% and the average class of student learning outcomes increased to 84.4 with the percentage of completeness of learning outcomes in cycle III 86.84% so that shows that T3> T2> T1> T0. In addition, the percentage of student worksheets scores increased in each cycle, the percentage of the first cycle worksheet value was 78.33%, increasing to 88.89% in cycle II. In the third cycle the percentage of LKS values increased again to 91.1% previously in the second cycle of 88.89% so that the proven Quantum Teaching model could improve learning outcomes. Quantum Teaching Model besides being able to improve student learning outcomes can also increase student activity. Based on the analysis of the observation sheet as a whole, the percentage of student activity increased from the first cycle of 50.64% to 63.03% in the second cycle and increased to 73.71% in the third cycle.

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