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Application of Problem Based Learning Model with Mind Mapping Method to Improve Activeness and Students Learning Outcomes of XI TKJ 2 in Network System Administration

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Article Info

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ABSTRACT

This research aims to improve the results of activeness and learning outcomes Network System Administration through the application of Problem Based Learning Model with Mind Mapping method grade XI student TKJ SMK N 1 Sukoharjo. This research is a class action research (PTK). The study was conducted in two cycles consisting of four phases: planning, implementation, observation, and reflection. The subject in this study is a grade XI student TKJ SMK N 1 Sukoharjo which amounted 35 students. The data collection techniques used are tests, observations, interviews, and documentation. Data validity test techniques use data source triangulation techniques and triangulation methods. Data analysis techniques use quantative descriptive analysis models. Based on the results of the research, it is important to know that the implementation of Problem Based Learning's model with Mind Mapping method can improve the results of activeness and learning outcomes Network System Administration in XI-grade students of TKJ SMK N 1 Sukoharjo. The conclusion in this study is the application of Problem Based Learning's model with Mind Mapping method can improve the results of activeness and learning outcomes Network System Administration XI students of the participating school.

Keywords: Problem Based Learning model, Mind Mapping method, Activeness, Learning Outcomes, and Network System Administration

DOI:

1. INTRODUCTION

According to (Amir 2015) education must consider all the changes in the era of knowledge, especially information and communication technology. Appropriate and procedural renewal must proceed in harmony with the implementation of appropriate, effective and quality education. One thing that can be improved is related to activeness's student and learning outcomes through an appropriate learning model.

During observation, the activeness and learning outcomes of students of class XI TKJ 2 when learning on the subject of Network Systems Administration took place very poorly in receiving learning theory. Student activeness can be seen from the enthusiasm of students in following the learning process, answering questions given by teacher, asking other students or teachers if they do not understand the problems faced, and looking for various information needed to solve problems, train themselves in solving problems or problems , and assessing the ability of self and the results obtained (Sudjana 2005: 72). Another aspect of students that teachers need to pay attention to is learning outcomes (Hamalik 2015). This is evident from observations during the learning process. The activeness of students at the time of action was only 65%.

Based on the results of pre-action tests, the theory absorption (class average) only recorded 31.43%. One effort to increase the activeness and learning outcomes of students that can be used by teachers is Problem Based Learning (PBL). PBL in the learning process is combined with mind mapping methods to practice the ability to solve problems in students while remembering information in the form of images, symbols, sounds, and forms and feelings as outlined in the road map for learning so that triggers memory. According to Prof. Howard Barrows and Kelson in (Amir 2015), Problem Based Learning (PBL) is a curriculum and learning process that is the problems that exist require students to gain important

knowledge so that they are more agile to solve problems and have more participation in teams with their own learning strategies. The learning process uses a systemic approach to solving problems or facing challenges that will later be needed in careers and everyday life. Whereas the mind mapping method supports students to be active and motivate in understanding the theory technically and conceptually that they make in notes with certain patterns according to their creativity. Mind Mapping (mind maps) that students make in their notes is based on the problems they face so that they can accommodate the way the brain works naturally and invite students to imagine an object as an interconnected whole (Long, D Carlson 2011). So that the combination of PBL learning models with mind mapping methods will greatly trigger students to be more active and help in understanding the theory technically and conceptually during the learning process.

Research (Sulaeman 2011) entitled Comparative Improvement of Physics Learning Outcomes Between Students Using PBL and Cooperative Learning Models. The results of his study showed an increase in learning outcomes that were higher using PBL learning models compared to Cooperative Learning, this can be seen from the average value obtained from the application of PBL models above the average value of 31.43% while in the cooperative model of 25, 72%. Based on the description above, it can be concluded that the Problem Based Learning (PBL) learning model can improve student learning outcomes.

Research (Apriyanto, Mulyani, and Susanti 2014) entitled The Effect of Mind Mapping Learning Methods and Students Memory Ability on Chemistry Learning Achievement in the Subjects of Basic Chemistry Laws in Class X Students of Odd Semesters in SMA Negeri 1 Mojolaban 2012/2013 Academic Year. The results showed a higher average difference in the mind mapping experimental class that was 79.4% compared to the conventional class (Teacher Center Learning) as many as 65.9%.

Based on the description in the background above, the objectives in this study are as follows. (1) Knowing the increase in students' learning activeness applying the Problem Based Learning learning model combined with the Mind Mapping method at SMK Negeri 1 Sukoharjo class XI TKJ 2 in the academic year 2019/2020 on the subject of Network System Administration. (2) Knowing the increase in student learning outcomes applying the Problem Based Learning learning model combined with the Mind Mapping method in SMK Negeri 1 Sukoharjo class XI TKJ 2 in the academic year 2019/2020 in the subject of Network System Administration.

2. RESEARCH METHOD

This type of research is a classroom action research (PTK). Because to help overcome problems faced practically in an emergency (Hopkins; Rapoport; n.d.). According to (Nodoushan 2009) classroom action research takes a different form from qualitative and quantitative research, the focus of this research is on classroom problems that require explanation and solutions. According to (Arikunto 2015: 16) in broad outline, the classroom action research method consists of four stages, namely (1) planning, (2) implementation, (3) observation, and (4) reflection. To collect data, in this study using test and non-test techniques. Observation sheets are used to collect data about the activeness and affective aspects of students in the learning process. According to (Supriyati 2011: 46) observation is a technique to collect research data that has a naturalistic nature that takes place in a natural context, the culprit naturally participates in interaction. The implementation of this research was carried out at SMK N 1 Sukoharjo in the 2019/2020 academic year. In this study, the subjects were class XI TKJ 2 SMK N 1 Sukoharjo, amounting to 35 people, 16 male students and 19 female students. Before conducting research, pre-action is carried out to be compared with the situation after the application is done. The results of the pre-action can be seen the results in Table 1.

3. RESULTS AND ANALYSIS

Pre-Action

Data on cognitive test scores for pre-action students are clarified in Table 1.

Table 1. Distribution of Cognitive Frequency Pre-Actions

No	Interval	Frequency value (*fi*)	Middle value (*xi*)	*fi. Xi*	Percentage	
					Relatively	Cumulative
1	56 – 58	2	57	114	5,71%	5,71%
2	59 – 61	2	60	120	5,71%	11,42%
3	62 – 64	5	63	315	14,3%	25,72%

4	65 – 67	15	66	990	42,85%	68,57%
5	68 – 70	7	69	483	20%	88,57%
6	71 – 73	3	72	216	8,57%	97,14%
7	74 – 76	1	75	75	2,86%	100%
Totals		35	462	2313	100%	
Average Score	2313 : 35 = 66,09					
Highest Score			76			
Lowest Score			56			
Students passing			11			31,43%
Students not yet passing		24				68,57%

Grades and percentage of cognitive completeness of pre-action students of class XI TKJ 2 SMK N 1 Sukoharjo are presented in Figures 1 & 2.

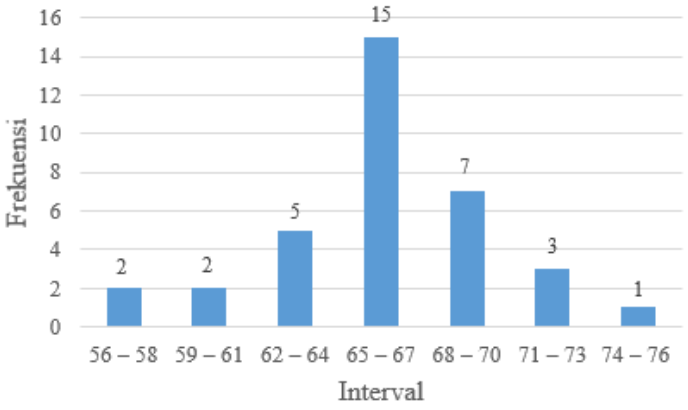

Figure 1. Cognitive Pre-Action Value

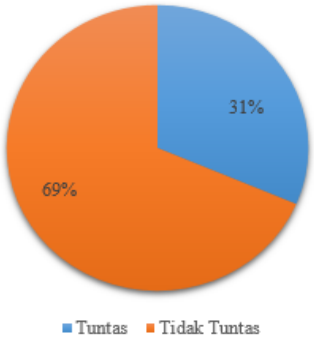

Figure 2. Percentage of completeness

Based on Table 1, Figure 1 and Figure 2, the cognitive value of pre-action students showed an average grade of 66.09. Student scores in the 56-58 interval were 2 students (5.71%). Student scores in the 59-61 interval were 2 students (5.71%). Student scores at the 62-64 interval were 5 students (14.3%). Student scores in the 65-67 interval were 15 students (42.85%). Student scores at the 68-70 interval are 7 students (20%). Student scores in the 71-73 interval were 3 students (8.57%). Student scores in the 74-76 interval are 1 student (2.86%). The highest value of 76 for the lowest value is 56. These results do not meet the average KKM value, which is ≥70. Students who have met the KKM are 11 students (31.43%), students who have not met the KKM are 24 students or (68.57%).

The completeness of psychomotor values before applying the Problem Based Learning's model with the Mind Mapping method to students of class XI TKJ 2 SMK N 1 S Sukoharjo is presented in Figure 3.

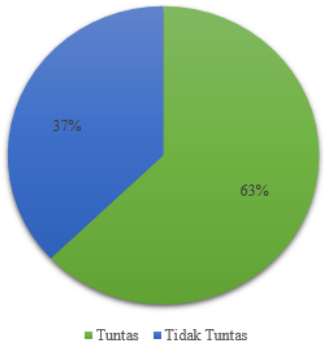

Figure 3. Percentage of Psychomotor

Based on Figure 3 above, psychomotor learning outcomes of students who completed were 22 students (62.86%), while as many as 13 students (37.14%) students who did not complete. The percentage of students in the affective domain of pre-action is discussed in Table 2 and Figure 4.

Table 2. Percentage of Action Affective

Attitude Aspect	Number of Students Appropriate	Percentage Completeness
Honest	12	34,28%
Responsible	31	88,57%
Dicipline	17	48,57%
Polite	26	74,28%
Percentage of Final Affective		61,43%

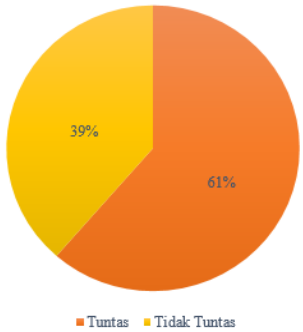

Figure 4. Percentage of Affective

The percentage of completeness of the affective domain of students in the pre-action was 61.43% which was categorized as less.

The percentage of activeness of pre-action students is discussed in Table 3 and Figure 5.

Table 3. Percentage of Activeness's Student

Attitude	Percentage
Pay attention to the teacher's explanation	70,71%
Asking question	57,85%
Answer the question	45,71%
Discuss in groups	80%
Solve the problem	80%

Pay attention to a friend's presentation	60,71%
Take notes on a summary of subject matter	60%
Percentage of Final Activeness's Student	65%

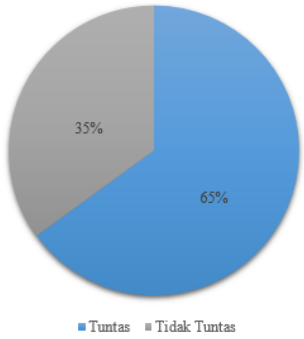

Figure 5. Percentage of Activeness

The percentage of observations of student activity in pre-action that is 65% can be categorized as less.

Cycle I

The action in cycle I was carried out in 3 meetings. One meeting, consisting of 2 lesson hours (2 x 45 minutes). Cycle I was held on 5, 7 and 8 November 2019 with details of learning activities as follows: (1) understanding, functions, strengths, weaknesses, and principles of File Server, (2) configuration of File Server with Samba and integrated with Active Directory, (3) testing and reporting of File Server configuration results with Samba and integrated with Active Directory.

In the first cycle the teacher applies the Problem Based Learning's model with the Mind Mapping method which is carried out according to the following stages: (1) begins with the teacher presenting authentic problems by giving a presentation / picture related to the material concerned, (2) forming a group students consisting of 3-4 people to work on worksheets and make mind mapping guided by the teacher, (3) presentations of work results to the front of the class that are evaluated / suggestions by the teacher and / or other groups / students in response to presentations from the presenter group, (4) at the end of the study, the teacher gives an individual test in the form of multiple choice.

Data on students cognitive test scores in the first cycle are clarified in Table 4.

Tabel 4. Distribution of Cognitive Frequency Cycle I

No	Interval	Frequency value (*fi*)	Middle Value (*xi*)	*fi. xi*	Percentage	
					Relatively	Cumulative
1	65 – 69	9	67	603	25,7%	25,7%
2	70 – 74	10	72	720	28,5%	54,2%
3	75 – 79	4	77	308	11,4%	65,6%
4	80 – 84	9	82	738	25,7%	91,3%
5	85 – 89	1	87	87	2,9%	94,2%
6	90 – 94	1	92	92	2,9%	97,1%
7	95 – 99	1	97	97	2,9%	100%
	Totals	35	574	2645	100%	
	Average Value	2645 : 35 =	75,57			
	Highest Score		96			
	Lowest Score		66			
	Students passing		25			71,43%
	Students not yet passing		10			28,57%

The value and percentage of cognitive completeness of the first cycle of class XI TKJ 2 students of SMK N 1 Sukoharjo is presented in Figures 6 & 7.

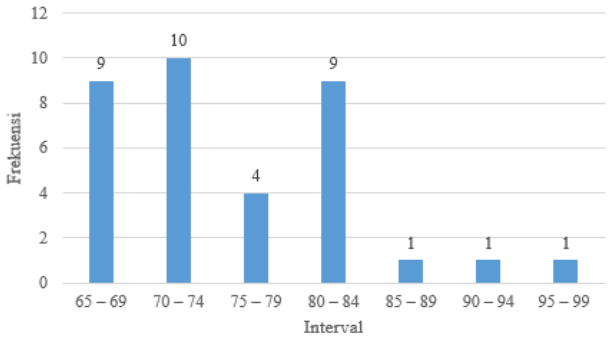

Figure 6. Cognitive Value Cycle I

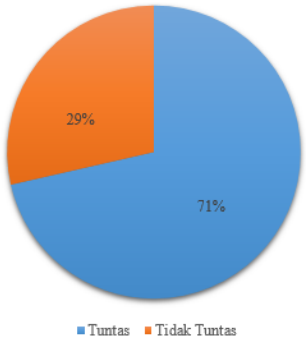

Figure 7. Percentage of completeness Cycle I

Based on Table 4, Figure 6, and Figure 7 on the average cognitive value of cycle I shows 76.57. Student scores in the 65-69 interval were 9 students (25.7%). Student scores at the 70-74 interval are 10 students (28.5%). Student scores in the 75-79 interval were 4 students (11.4%). Student scores in the 80-84 interval were 9 students (25.7%). Student scores in the 85-89 interval are 1 student (2.9%). Student scores at 90-94 intervals are 1 student (2.9%). Student scores at the 95-99 interval are 1 student (2.9%). The highest value is 96 while the lowest value is 66. The percentage of students' cognitive completeness in the Network System Administration is 25 students (71.43%) while students who are not complete are 10 students (28.57%). The number of students who have reached the KKM, has not met the specified research indicators, namely the number of students who fit the action ≥80% of the number of students in class XI TKJ 2 SMK N 1 Sukoharjo.

The completeness of psychomotor value in cycle I in class XI TKJ 2 SMK N 1 Sukoharjo is presented in Figure 8.

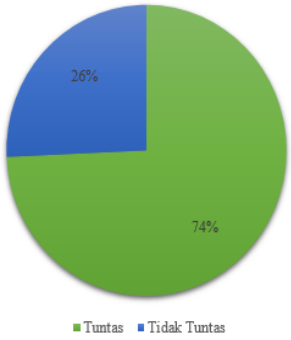

Figure 8. Percentage of Psychomotor Cycle I

Based on Figure 8, psychomotor grades of students in class XI TKJ 2 SMK N 1 Sukoharjo cycle I, students who meet KKM are 26 students (74.28%), students who are not complete are 9 students (25.71%), the number of students who complete have not reached the determined indicators of research achievement if the number of students who have reached the KKM ≥80% of the number of students in class XI TKJ 2.

The percentage of affective domain students in cycle I is discussed in Table 5 and Figure 9.

Table 5. Percentage of Affective Cycle I

Attitude Aspect	Number of Students Appropriate	Percentage Completeness
Honest	22	62,85%
Responsible	27	77,14%
Dicipline	27	77,14%
Polite	27	77,14%
Percentage of Final Affective		73,57%

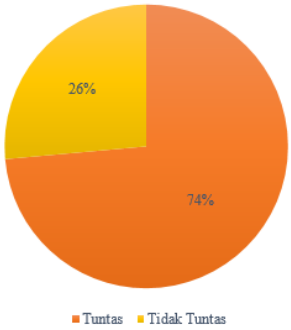

Figure 9. Percentage of Final Affective Cycle I

Based on Table 5 and Figure 9, the affective aspects of students in the first cycle increased, the lowest attitude aspect was the honest criteria when learning as much as 62.85% or 22 students who needed to be improved in the second cycle, because they had not yet reached the indicators of research performance, while for the percentage affective completeness 73.57% which is categorized as good.

The percentage of student activity in the first cycle is discussed in Table 6 and Figure 10.

Table 6. Percentage of Activeness's Students Cycle I

Attitude	Percentage
Pay attention to the teacher's explanation	85,71%
Asking question	72,14%
Answer the question	70,71%
Discuss in groups	84,28%
Solve the problem	84,28%
Pay attention to a friend's presentation	71,42%
Take notes on a summary of subject matter	71,42%
Percentage of Final Activeness's Student	77,24%

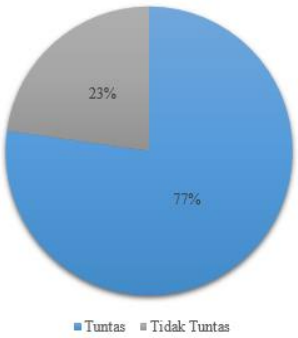

Figure 10. Percentage of Activeness's Student Cycle I

The percentage of observations of student activity in the first cycle of 77.24% which can be categorized as sufficient, but the activeness of students needs to be improved in the second cycle, because it has not yet reached the indicators of research performance.

Cycle II

The action in cycle II is carried out in 3 meetings. One meeting, consisting of 2 lesson hours (2 x 45 minutes). Cycle II was carried out on 19, 21 and 22 November 2019 with details of learning activities as follows: (1) understanding, functions, strengths, weaknesses, and principles of Web Server, (2) HTTP / HTTPS Web Server configuration with Apache / Nginx, and PHP Module, (3) testing and reporting of configuration results using the Web Browser on the Client. In cycle II the teacher applies the Problem Based Learning's model with the Mind Mapping method where improvements are made

to the first cycle according to the following stages: (1) begins with the teacher presenting authentic and open ended problems, followed by giving a related display / picture with the material in question, (2) the formation of a group of students consisting of 3-4 people to work on the worksheet and make a mind mapping freely looking for other references and guided by the teacher, (3) presentation of work results to the front of the class being evaluated / suggestions by the teacher and / or groups / other students in response to presentations from the presenter group, (4) at the end of the study, the teacher gives an individual test in the form of multiple choice, and applies an open ended approach again so students can write / express the difficulties found.

Data on students cognitive test scores in the first cycle are clarified in Table 7.

Table 7. Distribution of Cognitive Frequency Cycle II

No	Interval	Frequenc value (*fi*)	Middle Value (*xi*)	*fi. xi*	Percentage	
					Relatively	Cumulative
1	65 – 69	4	67	268	11,4%	11,4%
2	70 – 74	1	72	72	2,9%	14,3%
3	75 – 79	1	77	77	2,9%	17,2%
4	80 – 84	10	82	820	28,6%	45,8%
5	85 – 89	15	87	1305	42,8%	88,6%
6	90 – 94	2	92	184	5,7%	94,3%
7	95 – 99	2	97	194	5,7%	100%
Totals		35	574	2920	100%	
Average Value		2920 : 35 =	83,42			
Highest Score			96			
Lowest Score			66			
Students passing			31			88,57%
Students not yet passing			4			11,43%

The value and percentage of cognitive completeness in cycle II students of class XI TKJ 2 SMK N 1 Sukoharjo is presented in Figures 11 & 12.

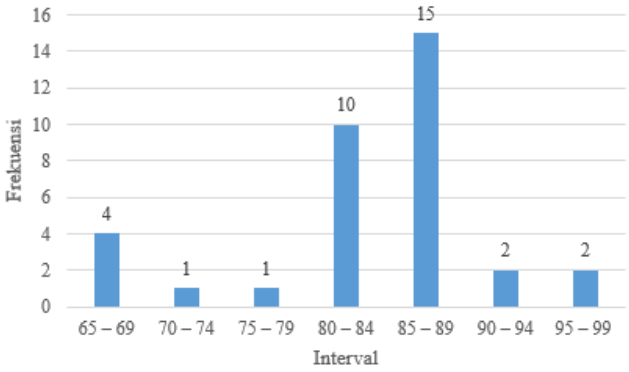

Figure 11. Cognitive Value Cycle II

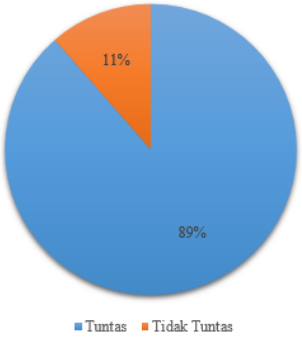

Figure 12. Percentage of completeness Cycle II

Based on Table 7, Figure 10 and Figure 11, the average value of cognitive class II cycle is 83.42. Student scores at the 65-69 interval were 4 students (11.4%). Student scores at the 70-74 interval are 1 student (2.9%). Student scores in the 75-79 interval are 1 student (2.9%). Student scores in the 80-84 interval are 10 students (28.6%). Student scores in the 85-89 interval were 15 students (42.8%). Student scores at 90-94 intervals are 2 students (5.7%). Student scores at the 95-99 interval were 2 students (5.7%). The highest value is 96, while the lowest value is 66. These results meet the average KKM value, which is ≥70 and the grades of students in class XI TKJ 2 have reached the indicator of achievement in the study that is students who have fulfilled the KKM ≥80% of the total students in class XI TKJ 2, the number of students who

completed the Network System Administration subject was 31 students (88.57%), students who did not complete were 4 students (11.43%).

The completeness of cycle II psychomotor scores in class XI TKJ 2 SMK N 1 Sukoharjo is presented in Figure 13.

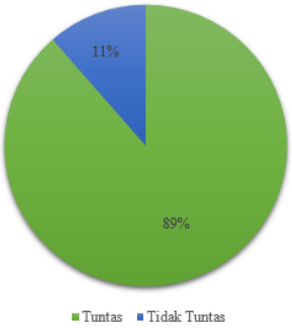

Figure 13. Percentage of Psychomotor Cycle II

Based on Figure 13, students who have met the KKM are 31 students (88.57%) while students who have not completed are 4 students (11.43%), the number of students who have completed the specified research achievement indicators so that the research is sufficient until the second cycle .

The percentage of affective domain students in cycle II is discussed in Table 8 and Figure 14.

Table 8. Percentage of Affective Cycle II

Attitude Aspect	Number of Students Appropriate	Percentage Completeness
Honest	27	77,14%
Responsible	27	77,14%
Dicipline	28	80%
Polite	34	97,14%
Percentage of Final Affective		82,86%

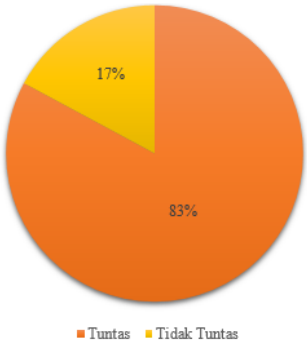

Figure 14. Percentage of Affective Cycle II

Based on Table 8 and Figure 14, the affective aspects of students in the second cycle increased, students who were included in the honest criteria during learning were 77.14% or 27 students. The final score of the second cycle affective observation that is 87.5 can be categorized very well while the affective completeness percentage is 82.86%.

The percentage of student activity in cycle II is discussed in Table 9 and Figure 15.

Table 9. Percentage of Activeness's Cycle II

Attitude	Percentage
Pay attention to the teacher's explanation	91,42%

Asking question	74,28%
Answer the question	74,28%
Discuss in groups	85%
Solve the problem	90%
Pay attention to a friend's presentation	79,28%
Take notes on a summary of subject matter	80,71%
Percentage of Final Activeness's Student	82,14%

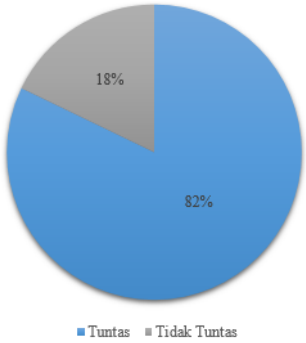

Figure 15. Percentage of Activeness's Cycle II

The percentage of observations of student activity in the second cycle was 82.14% which could be categorized as good and had met the indicators of research achievement.

4. CONCLUSION

Based on the results of the analysis and discussion, after applying the Problem Based Learning's model with the Mind Mapping method, it can be concluded as follows: (1) The activeness of students increases as seen from the percentage of completeness obtained in cycle I of 77.24% which can be categorized sufficiently and increases in cycle II to 82.14% which can be categorized as good, (2) the cognitive learning outcomes of students increased as seen from the percentage of completeness obtained in cycle I of (71.43%) or 25 students who completed while 10 students who did not complete 28.57%) and increased in cycle II to 31 students who completed (88.57%), students who did not complete 4 students (11.43%), (3) Psychomotor learning outcomes of students increased as seen from the percentage of completeness obtained in the first cycle of (74.28%) or 26 students, students who did not complete were 9 students (25.71%) and increased in the second cycle to (88.57%) ie 31 students while students who had not yet completed namely 4 students (11.43%), (4) the affective learning outcomes of students increased as seen from the percentage of completeness obtained in the first cycle of 73.57% can be categorized well and increased in the second cycle to 82.86% which can be categorized very well.

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