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Effectiveness of Model *Problem Based Learning* with Video Learning Imun System Materials in Sma N 1 Semarang

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Abstract

Problem based learning (PBL) with video can be the concept of student knowledge on immune system material. The PBL 2013 model is widely used in learning or curriculum, but implementation is rarely used in learning. Based on preliminary observation at SMA N 1, it is known that the absorption capacity of immune system is 21.91% at national exam is the lowest. This research on the effectiveness of problem-based learning models with videos on student learning results in cognitive, affective and psychomotor aspects. The research sample consists of three experimental classes. Data sources include students' cognitive learning outcomes (pretest-posttest), affective learning outcomes, psychomotor learning outcomes, teacher qualitative descriptive analysis (interview) and student responses with descriptive percentage analysis. Data were analyzed by using the cognitive learning outcomes (pretest-posttest) in experimental classes. The questionnaire of learning implementation shows that the PBL with video on the immune learning system has been done well. The calculation of the N-gain value, the experimental classes has been increased by 0.77 with the high category. Based on the results of the research, it can be concluded that the PBL model for students is effective in applying material to cognitive, affective and psychomotor learning outcomes of students in SMA N 1 Semarang.

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INTRODUCTION

Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively developing his potential to have religious spiritual strength, self-control, personality, intelligence, noble character, and skills needed by himself, society, nation and state (UU No.20 year 2003 article 1 paragraph 1). In Process Standards it is stated that the learning process in the education unit is held interactively and pleasantly for students. The teacher is not the only main learning resource and learning applies the principle that anyone is a teacher, whoever is a student, and anywhere is a class. (Permendikbud Number 22 Year 2016)

Biology learning process based on 2013 Curriculum syllabus is more organized and detailed than KTSP. In the 2013 curriculum syllabus, there is a detailed explanation regarding the process, learning model, and evaluation that must be done by the teacher. One of the models developed in the 2013 curriculum is *Problem Based Learning*. The view of 2013 curriculum learning is that in order to truly understand and be able to apply knowledge, students need to be encouraged to work on solving problems. (Ministry of Education and Culture, 2013)

Learning outcomes are one indicator that can be used to measure one's learning success. Learning outcomes are very important because they can be a clue to how far students succeed in learning activities that have been carried out. Learning outcomes include cognitive, affective, and psychomotor domains. Based on the results of observations at SMA N 1 Semarang, it was found that biology learning obtained an average score of many students who had not yet reached the specified KKM, is 75. The average results SMA N 1 Semarang of Biology Exam in 2015-2017 tended to decline . In 2015 the national biology exam average was 75.37, in 2016 it was 72.88 and in 2017 it was 71.33. (Ministry of Education and Culture, 2017)

Besides from the average score of students National Examination in 2015-2017 can also see the students absorption in mastering Biology material, especially Immune System material is the lowest. Percentage of mastery of the immune system material for the National Exam of SMA N 1 Semarang year 2014/2015 is 21.91% at the school level, 22.24% at the district / city level, 20.75% at the provincial level, and 24.97% at the national level. (National Strandar Education Agency BSNP, 2015). The results of interviews with Biology teachers at SMA N 1 Semarang are known in recapitulation book year 2016/2017, more than 60% of students have not reached the KKM in Immune System material. Immune System Material is material that addresses the body's defense system. The low absorption of students in immune system material can be used as an indicator of students having difficulty learning in this material.

Immune System Material is found in Basic Competencies (KD) 3.14 curriculum 2013 which is analyzing the role of the immune system and immunization against physiological processes in the body and basic competencies (KD) 4.14 which is campaigning on the importance of various programs and types of immunization and abnormalities in the immune system in various forms information media. To achieve the objectives of KD 3.14 and KD 4.14, it should use relevant learning models and media to support the achievement of teaching goals. Teachers can apply model *Problem Based Learning* with videos in the Immune System material learning.

Problem Based Learning is an active learning model that starts from a particular problem. Through group discussions, individual studies and collaboration in small groups, students discover their own knowledge, try to understand the mechanisms from the problem and solving the problem together. The teacher acts as a tutor who guides students and supports student initiatives (Witte and Rogge, 2012). Learning using the model *problem based learning* can optimize the potential of students to learn because in their learning actively involves students. Students will have greater responsibility because students work more than just listening to information, in addition students are also trained to develop high-level thinking skills and creative mindsets (Utomo *et al. ,* 2014*).*

In addition to choosing the right learning model, media has an important role in the learning process. Media is one component of communication, namely the messenger from the communicator to the communicant. Media learning is used to help students gain knowledge. Immune system material can be studied by using video as a learning resource to improve student meaning (Santyasa, 2007). Video is a learning media where students can construct or build what they get through the sense of sight and hearing which then produces a meaning from learning. Video will provide experience to students and show real things that at first did not allow for direct viewing. (Prastowo, 2012).

RESEARCH METHODS

The research conducted in SMA N 1 Semarang. The research method is *Pre Experiments* with *One-group Pretest-Posttest Design*. The subjects of this research were students of grade XI MIPA 1, XI MIPA 7 and XI MIPA 8 SMA N 1 Semarang as the experimental class. Determination of research subjects using *purposive sampling technique*. The independent variable of this study is the application of model *Problem Based Learning* and video on the immune system learning material, while the dependent variable is the student learning outcomes in the immune system material which is seen from the cognitive, affective and psychomotor aspects. Data sources include cognitive learning outcomes of students (*pretest-posttest*), affective learning outcomes, psychomotor learning outcomes, teacher responses (by interviews) which are analyzed qualitatively descriptive and student responses with percentage descriptive analysis. Data were analyzed using n-gain test to determine the increase in students' cognitive learning outcomes (*pretest-posttest*) in the experimental class.

RESULTS AND DISCUSSION

Students' Cognitive Learning Outcomes

Student learning outcomes were obtained from the values of the *pretest* and *posttest* in experimental class. Based on the research data, the student cognitive learning outcomes data are as follows.

Table 1 P*retest* and *posttest* results in Experimental Class

Category	Grade XI MIPA 1		Grade XI MIPA 7		Grade XI MIPA 8	
	Pretest	***Posttest***	***Pretest***	***Posttest***	***Pretest***	***Posttest***
Number of students	38	38	40	40	34	34
Average	40,78	90	38,62	88	40,74	75

Highest score	65	100	65	100	65	90
Lowest score	25	75	20	65	10	50
Completeness		100%		95%		68%
N-gain		0,83		0,8		0,68
Classical completeness				88%		
N-gain score				0,77		
N-gain category				High		
Highest score				100		
Lowest score				50		

Table 1 shows the scores pretest-posttest in the experimental class. The data *pretest* and *posttest* from each class were tested n-gain to find out the extent of improvement in learning outcomes on cognitive aspects. From the data analysis, the results showed that the experimental class had *N-gain* in the high category. Learning outcomes are obtained from evaluations (scores *post test*). Students had fulfill KKM if their learning outcomes are ≥75. Of the three experimental classes it was known that the completeness of the experimental class was 100%, 95%, and 68%. Classical completeness of students' cognitive learning outcomes is 88%. The aim of *Problem based learning* is presenting students with authentic and meaningful problem situations that can make it easier for them to carry out investigations and inquiry. *Problem Based Learning* is more oriented to student activities to obtain learning outcomes in the form of a combination of cognitive, affective, and psychomotor aspects proportionally (Mulyani *et al*, 2015).

Learning Outcomes Affective Aspects

According to the Ministry of National Education, in Government Regulation number 32 of 2013 concerning National Standards of Education, affective assessment becomes an important component of evaluation that must be carried out by educators, in this case the teacher. Affective domains are learning outcomes seen in students in various behaviors and assessed using observation sheets. The following are the affective aspects of learning outcomes data from 3 experimental classes.

Table 2 Results of votes Class Experiments attitude

Category	Attitude Observation Value										Total
	Discipline					Courtesy					
	N1	N2	N3	N4	N5	N1	N2	N3	N4	N5	
Total score	322	325	334	330	333	336	336	335	336	336	
Maximum score	336	336	336	336	336	336	336	336	336	336	
Average											98.90
Completeness											100%
Criteria											Very good

Table 2 shows the average score of attitude assessment is 98.9 with very good criteria. The completeness of affective learning outcomes is 100% in the excellent category. Factors that can influence attitudes according to Rajecki in Ruslan (2010) consist of 3 components, known as ABCs of attitude which include *affect, behavior* and *cognition.* Affect (feeling or emotion) this component is related to feeling happy, like, love, fear, hate, sad and

proud to be sick or tired of something. Learning using model *Problem based learning* with videos can increase students' enthusiasm. According to students learning atmosphere using the model becomes more interesting and fun that it helps students make easier to understand immune system material.

Behavior or conative, this component more displays the behavior of a person, behavior or attitude referred in this study are disciplined and polite attitude. The disciplinary attitudes include arriving on time, wearing uniforms according to rules and regulations, orderly in following learning, working assignments given by the teacher and collecting assignments on time. The courtesy includes respecting older people, not saying dirty words, respecting the opinions of others, asking permission when leaving the room before the learning is finished, and not interrupting the conversation at the wrong time. Learning methods that are applied in a class can affect the activities of students in the class. The assignment of making posters and LDS in learning can train students' discipline for example, is shown at the time of the collection of tasks that are timely (Hastutiningsih *et al,* 2016).

Cognition (understanding or reason) component of cognition is related to the reasoning of someone to assess an information. Based on the results of the research, it can be seen that the completeness of the assessment of discipline and courtesy in SMA Negeri 1 Semarang is 100%.

Learning Outcomes of Psychomotor Aspects

Psychomotor aspects are carried out to achieve KD 4.14, namely campaigning on the importance of various programs and types of immunizations and abnormalities in the immune system in various forms of media information. Psychomotor learning outcomes are carried out through assessing student presentations and making posters to campaign the importance of various programs and types of immunization. Based on table 3, it is known that student activity during the presentation and poster making of the importance of various programs and types of immunization in the experimental class received high and very high predicate. Students who have high enthusiasm in working together when making posters will be able to tell more about the purpose of the posters they had made, and students will also be more confident when explaining and giving presentations. The task of the poster given is related to the immune system material in order to achieve the objectives of KD 4.14. The task of this poster provides an opportunity for students to work together with their groups to use the knowledge and information obtained to complete poster assignments and campaign for the importance of various programs and types of immunization. In making posters students are required to make appeals and invitations to immunization programs. Giving poster assignments aims so that students can provide problem solving about problems that are rife around their place. Giving poster assignments is able to measure students' creativity. Students become more creative because students are given the opportunity to express ideas that will be posted on the poster. The results of the analysis of learning in the psychomotor aspects of the experimental class are presented as follows:

Table 3 Percentage of completeness of psychomotor aspects.

Aspects		Average Score(%)	Category
Student activities at presentation	Sound clarity delivering material	87.5	High
	Shows the work	100	Very high
	Student activities when following the	87,5	High

	presentation		
	Ability to answer questions	87,5	High
	Mastery of material at presentation	87,5	High
Score making poster	Image according to purpose	94,6	Very high
	Picture according to the slogan	80,4	High
	Picture according to the message delivered	73,2	High
	words used in accordance with the purpose of the poster	89,3	High
	Interest in reading	85,7	High

Teacher's response

The teacher's response to the application of *Problem based learning* with video on immune system material learning needs to be examined. Learning Outcomes have increased but it is not necessarily the teacher to feel comfortable and happy with the applied learning. Biology teacher's response in grade XI at SMA N 1 Semarang to learning material biology in the immune system using model *problem based learning* with videos taken through interviews. Overall, the teacher gives a positive response to the learning being carried out. Summary interviews presented as follows:

Table 4 Summary of Teacher's Responses to Model *Problem Based Learning* with Video on Learning Immune System Materials

No	Basic Question	Teacher's Responses
1.	Impression of learning	Learning has been done well and is able to be able to take advantage of phenomena and present real problems that are close to students as a source of learning so as to optimize student learning outcomes. The use of videos is very effective in increasing students' understanding of immune system material.
2.	Effectiveness of student understanding	Learning is more meaningful because students not only read and see pictures in the book but also observe a process through video.
3.	Influence on learning outcomes	Learning encourages students to recognize the ways of learning and collaboration in groups, preparing students to think critically and analytically in solving problems so that they can improve learning outcomes.
4.	Student activities	Students engage enthusiastically and are more active during learning activities, students also have greater curiosity because they are faced with phenomena or problems that are close to the lives of students.
5	Criticism and suggestions	Problem solving is a pretty good technique to better understand the contents of the lesson. The success of this learning requires enough time and preparation to find interesting problems to solve so that students are enthusiastic.

The results of teacher responses in Table 4 show that from the five aspects asked, the teacher said that the applied learning had been able to optimize student learning outcomes.

Student Responses

The results of the student responses to themodel *Problem based learning* with videos on immune system material learning are presented in the following table:

Table 5 Analysis of student responses to learning

No	Questions	The answer		The answer "ya" (%)
		Yes	No	
1.	Student agreed model of *problem based learning* with video help simplify study immune system material	112	-	100
2.	*Problem based learning* with video media suitable to be applied on the material of the immune system	112	-	100
3.	the learning atmosphere during the study is more interesting and enjoyable	98	14	87,5
4.	*Problem based learning* with video media adds to the learning experience of students directly	100	12	89,28
5.	Students are satisfied with the data obtained from the learning model of *problem based learning* with video on the material of the immune system	102	10	91,1
6.	learning activities use the model of *problem based learning* with video can train cooperation within group	98	14	87,5
7.	Used video help students in understanding the immune system materials	110	2	98,2
8.	Picture and animation in a media that is used to help students understand the immune system materials	112	-	100
9.	Teacher conduct the discussion and presents problems related to everyday life in the learning process	110	2	98,21
10.	students agree model *problem based learning* with video is applied to other biological material	112	-	100
Total		1066	54	
Percentage of answers (%)		95,18	4,82	

Based on the analysis data in Table 5, it can be seen that students gave yes responses is 95.18%, while 4.82% gave no responses. This means that students have a great interest in learning activities carried out. Implementation *Problem based learning* optimal with video to support the improvement of students' cognitive learning outcomes in immune system material. However, even though students' cognitive learning outcomes have increased, there are still many students who have not completed the score KKM of *posttest*. Based on the data, student responses show that some students still have difficulty in understanding the immune system materials, these students are less motivated in learning and tend to be passive.

CONCLUSION

Based on the results of the analysis and discussion, it can be concluded that *Problem based Learning* with video is effective on student learning outcomes in immune system material at SMA N 1 Semarang.

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