The Effect of Problem Solving Models on Concept Mastery and Student Learning Outcomes about Biology in Junior High Schools

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Abstract

This study aims to determine the effect of the application problem-solving models on the students' mastery of concepts and student learning outcomes about biology at class VIII SMP Negeri 16 Palu. This type of research is quasi-experimental. The study population was all grade VIII students of SMP Negeri 16 Palu in the 2019/2020 academic year, totalling 128 students. The sample of the study was students of class VIIIA as an experimental group with a total of 32 students and class VIIID as a control group with a total of 32 students. The sample was determined by cluster random sampling technique. Data analysis was performed using the t-test and the Mann-Whitney U test.

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Introduction

Aspects of necessary thinking ability are the process of achieving educational goals in formal educational institutions, in this case, schools have a very important role because the teaching and learning process occurs between teachers and students. However, achieving the goal or learning success is not easy like turning the palm of the hand but requires a long process. The teaching and learning process is not only limited to transferring information from teachers to students but is a complex process. Students learn from everything that happens in learning. Students will learn the best sciences when teaching methods allow them to be actively involved in class activities. In this case, students must participate actively in conducting experiments, carrying out demonstrations,

Education is also one aspect that plays a role in developing the quality of human resources. This quality improvement can be done by developing methods, models, and strategies for teaching and learning in education. Biology as a subject that has knowledge, critical thinking, and investigation, requires appropriate learning methods, and models to improve learning outcomes in accordance with learning objectives. The learning model refers to the approach to be used, including learning objectives, learning stages, learning environment, and class management (Suprijono, 2012).

Mataka et al. (2014), explain that teachers must emphasize the acquisition of problem-solving skills effectively and as often as possible for students, ranging from small to complex problems. This is done so that students are used to problems, problem-solving skills, and critical thinking that are actually needed in activities. Learning in addition to expertise in doing questions. Students who have problem-solving skills will find it easier to solve problems. Learners must integrate skills, knowledge, and attitudes to develop a better understanding of scientific concepts.

Based on the results of preliminary observations, SMP Negeri 16 Palu as one of the formal educational institutions in the daily learning activities of teachers still often uses the lecture and question and answer method. The use of the lecture method in learning can cause the level of thinking skills of students to be low, namely only remembering, recognizing, and explaining. Students have not been able to formulate questions well and still cannot analyze and solve a problem given by the teacher properly. They tend to wait for answers and explanations from the teacher and are not willing to seek solutions to their problems. This causes students to be less active in teaching and learning activities.

Especially in biology, these developments are not yet right. This inaccuracy is because the teaching and learning process is still passive, does not understand the material in biology subjects, and

ultimately has an impact on the low learning outcomes obtained, which only reaches 60% not reaching the standard of learning completeness set in school. The learning completeness standard used in SMP Negeri 16 Palu is the individual completeness value of 75% and classical learning completeness at least 65%. The completeness value is often obtained by a student after taking remedial or repetition exams. The learning completeness standard used in SMP Negeri 16 Palu is the individual completeness value of 75% and classical learning completeness at least 65%. The completeness value is often obtained by a student after taking remedial or repetition exams. The learning completeness standard used in SMP Negeri 16 Palu is the individual completeness value of 75% and classical learning completeness at least 65%. The completeness value is often obtained by a student after taking remedial or repetition exams.

Students at SMP Negeri 16 Palu have difficulty understanding biological concepts. This is because one of the teachers paid less attention to the use of learning models with the appropriate application of basic competencies. The use of the learning model by the teacher does not lead to learning that refers students to think about solving a problem in learning so that students' thinking skills do not develop. In addition, students are more likely to be given concepts with an old-fashioned approach where the teacher explains learning clearly and students take notes and memorize. So the concepts that the students want are those that the teacher directly gives them without discovering them themselves. As a result, students only know these concepts without understanding them in depth, and explain the relationship of one concept to another. In the learning process, teachers also often do not pay attention to the development of students' self-concepts, teachers only carry out their duties as teachers, teachers only convey subject matter, do not try to improve positive self-concepts in students which can trigger student success to achieve maximum concept mastery.

Efforts to improve students' mastery of concepts and learning outcomes include applying a learning model that can make all students active and understand learning in the teaching and learning process, namely by applying a problem-solving learning model. The problem-solving learning model is a learning model that presents material by exposing students to problems that must be solved.

Problem-solving is a mental and intellectual process of finding a problem and solving it based on accurate data and information so that accurate conclusions can be drawn. Problem-solving provides the opportunity for students to take an active role in learning, looking for and finding information by themselves and processed into concepts, principles, theories, or conclusions, (Mbembok et al. (2017).

The problem-solving learning model is a way of presenting lesson material by making problems as a starting point for discussion to be analyzed in an effort to find solutions or answers by students and problem-solving is done in groups. Thus it can be concluded that the problem-solving learning model is a learning model that involves students directly and can train students to face various problems and find solutions to problems or solutions to these problems both individually and in groups. The use of problem-solving learning models will be implemented at SMP Negeri 16 Palu. The success of this learning model depends on the role and high control of the teacher in learning activities. Several research results show that the application of problem-solving learning models has an effect on improving the quality of the learning process, mastery of concepts, and student learning outcomes. Student learning outcomes through the application of problem-solving learning models are the results that have been achieved or obtained by students from the experiences and exercises they have participated in during the learning process, in the form of cognitive, affective, and psychomotor skills. Where the learning outcomes are the abilities possessed by students after receiving their learning experiences. Learning outcomes are the completeness or success of students in understanding the subject matter expressed in numbers. These learning outcomes were obtained from the test results given after the learning process took place (Amase et al. 2014).

Based on the description of the background, the researcher is interested in raising the title of the research to the effect of the application problem-solving model on the mastery of concepts and student learning outcomes about biology at class VIII SMP Negeri 16 Palu.

Materials and Method

This type of research is a quasi-experiment. The research design used a nonequivalent control group design. The research design is presented in Table 1.

Table 1. Quasi experimental research design

Group	Pretest	Treatment	Posttest
Experiment class	O1	X1	O2
Control Class	O3	X2	O4

Information:

O1 = The pretest value of the experimental group

O3 = Control group pretest value

O2 = Posttest scores of the experimental group

O4 = The posttest score of the control group

X1 = Treatment of problem-solving learning models

X2 = Treatment using direct learning (lectures).

This research was conducted at SMP Negeri 16 Palu class VIII. The population in this study were all students of SMP Negeri 16 Palu who were registered in the 2019/2020 academic year

The samples in this study were 2 classes: 1) class VIIIA as an experimental class with 32 students and class VIIID as the control class with 32 students.

The sampling technique in this study was carried out by using a cluster random sampling technique.

Operationalization of variables

The problem-solving learning model is a learning model by presenting learning materials by making the problem as a starting point for analysis to be analyzed in an effort to find solutions or answers by students either individually or in groups, to see student responses to learning using the problem-solving learning model measured using a questionnaire.

Concept mastery is an understanding of students appreciating the ability to learn learned by applying problem-solving learning models in the process of concept discovery or preparation. Mastery of this concept is needed by students because mastering the concept can make students understand the concept of the material being taught and can make it easier for students to understand the material taught by the teacher. Concept mastery is measured using a Likert scale in the form of a checklist.

Learning outcomes are everything that is obtained by students after carrying out learning activities for a certain time by applying problem-solving learning models. Students' learning outcomes whose level of completeness are measured using learning outcomes tests.

Types and sources of data

Qualitative data

Qualitative data is data obtained during teaching and learning activities, the implementation of learning by applying a problem-solving learning model that includes student responses against learning.

Quantitative data

Quantitative data: a) data obtained from mastery of concepts after participating in learning by applying problem-solving learning models, and b) data obtained from student learning outcomes in doing biology questions given through the final test of learning based on scoring scores.

Data collection technique

Observation

The observation technique aims to collect data about student activities during the learning process. Observations are made by the observer using the observation sheet that has been developed.

Questionnaire

Information about student responses to learning activities is by applying problem-solving models that are carried out at the end of learning.

Test technique

The test technique is used to determine the student learning outcomes given at the end of the lesson

Research instruments

Written test, and questionnaire

Research instrument test

Validity test

To measure the validity level of the instrument, the product-moment correlation formula is used as stated.

Reliability test

The reliability test for cognitive test questions (description) using the Cronbach alpha technique is calculated using the following formula proposed.

Data analysis technique

Prerequisite test

Normality test

The normality test used is the Kolmogorov-Smirnov test with the help of the SPSS for Windows 21 program. The basis for the decision-making of the Kolmogorov-Smirnov normality test is:

If the significant probability value is $\geq \alpha$ (0.05), then the sample data comes from a normally distributed population. If the significant probability value $\leq \alpha$ (0.05), then the sample data comes from a population that is not normally distributed

Homogeneity test

The data homogeneity test used the Levene's Test for Equality of Variance with the following formula proposed by Arikunto (2013).

$$F = \frac{s_1^2}{s_2^2} \text{ Where } s^2 = \sqrt{\frac{N\sum X^2 - (\sum X)^2}{n(n-1)}}$$

Information:

F: Homogeneity.

s_1^2 : The largest variant.

s_2^2 : The smallest variant.

The test criteria are:

If Fcount≤ Ftable or probability value ≥ α (0.05), then H0 is accepted, which means that the population variance of the two variables is homogeneous. If Fcount> Ftable or probability value <α (0.05) then H0 is rejected, which means that the population variance of the two variables is not homogeneous (Arikunto, 2013).

Hypothesis test

Hypothesis tests both t-test and simple linear regression tests were carried out using the support of the SPSS for windows 21 application. The t-test formula and the simple linear regression formula are as stated by Sugiyono (2008).

Table 2. Results of normality test of concept mastery preliminary test data

One-Sample Kolmogorov-Smirnov Test		Experiment	Control
N		32	32
Normal Parametersa, b	Mean	46.59	44.63
	Std. Deviation	4.226	4.376
	Absolute	.226	.198
Most Extreme Differences	Positive	.149	.198
	Negative	-.226	-.145
Kolmogorov-Smirnov Z		1.277	1.123
Asymp. Sig. (2-tailed)		.077	.161
a. Test distribution is Normal.			
b. Calculated from data.			

Table 3. Results of the T-test analysis of the students' initial concept mastery test

No	Group	N	Average	df	P. Sig.	Tcount	Table	Conclusion
1	Experiment	32	46.59	62	0.072	1.831	1.670	μ1 = μ2
2	Control	32	44.63					

Table 4. Results of normality test data initial student learning outcomes

One-Sample Kolmogorov-Smirnov Test		Experiment	Control
N		32	32
Normal Parametersa, b	Mean	58.63	55.25
	Std. Deviation	6.857	7.919
	Absolute	125	, 184
Most Extreme Differences	Positive	108	184
	Negative	- 125	- 118
Kolmogorov-Smirnov Z		708	1.040
Asymp. Sig. (2-tailed)		699	230
a. Test distribution is Normal.			
b. Calculated from data.			

Table 5. Homogeneity test results initial test data student learning outcomes

Levene's Test for Equality of Variances	
F	Sig.
0.968	0.329

Table 6. Results of data normality test in final test of students' mastery of concepts

One-Sample Kolmogorov-Smirnov Test

		Experiment	Control
N		32	32
Normal Parametersa, b	Mean	77.69	67.28
	Std. Deviation	10.709	6.712
Most Extreme Differences	Absolute	.169	.176
	Positive	.169	.176
	Negative	-.143	-.139
Kolmogorov-Smirnov Z		.957	.994
Asymp. Sig. (2-tailed)		.319	.276

a. Test distribution is Normal.

b. Calculated from data.

Table 7. Results of Mann-Whitney U analysis of students' concept mastery final test

No.	Group	N	Mean Rank	P. Sig	A	Conclusion
1	Experiment	32	42.25	0.000	0.05	$\mu_1 \neq \mu_2$
2	Control	32	22.75			

Table 8. Result data normality test for final test of learning outcomes

One-Sample Kolmogorov-Smirnov Test

		Posttest Experiments	Posttest control
N		32	32
Normal Parametersa, b	Mean	87.75	70.78
	Std. Deviation	7.148	7.308
Most Extreme Differences	Absolute	.216	.193
	Positive	.216	.193
	Negative	-.139	-.176
Kolmogorov-Smirnov Z		1.219	1.093
Asymp. Sig. (2-tailed)		.102	.183

a. Test distribution is Normal.

b. Calculated from data.

The effect of the application problem solving model on students'mastery of concept and learning outcomes.

The results of the research which was carried out through the application of the problem-solving model to the students 'conceptual mastery of biology at class VIII SMP Negeri 16 Palu, obtained the median of the final test of mastery of the concept of learning of the experimental group students with the median of the final test of mastery of the control group students' learning concepts was significantly different. The median of the final test of mastery of the concepts of the experimental group students was 42.25, higher than the median of the final test of mastery of the biological concepts of the control group students which was 22.75. The final test of students' mastery of biological concepts was analyzed using non-parametric analysis because one of the prerequisite tests for the parametric t-test was not fulfilled. The non-parametric test used is the Mann-Whitney U test, where the results show the median difference between the experimental group

and the control group. As for the aspects of the biology learning outcomes of students, it was obtained that the final test average of the biology learning outcomes of the experimental group students with the average final test of the biology learning outcomes of the control group students was significantly different. The average final test result of students' biology learning outcomes in the experimental group was 87.75, higher than the average final test of biology learning outcomes of students in the control group which was 70.78.

These results are in line with research conducted by Astuti (2017), where problem-solving learning has a positive and significant effect on mastery of the science concept. This is also in line with the research results Khairani & Safitri (2017) who found that the application of problem-solving learning has an effect on student learning outcomes, as indicated by the N-gain value of student learning outcomes taught using problem-solving learning.it is higher at 100%, compared to students who are

taught with non-problem-solving learning and who only achieve an N-gain value of 55%.

Based on these results it turns out that the first and second work hypotheses proposed are accepted. Thus it can be said that problem-solving learning affects students' mastery of concepts about biology at class VIII SMP Negeri 16 Palu (H11), and problem-solving learning affects student learning outcomes about biology at class VIII SMP Negeri 16 Palu (H12). These results were obtained because in the application of problem-solving learning students were given the widest opportunity to construct their knowledge through solving/answering each given question so that the process could give birth to a better level of conceptual mastery than conventional learning using the lecture method.

Learning problem solutions greatly influences the mastery of biological concepts because of the activity of students formulating answers in solving problems/questions given in the learning process. This is because it is able to activate students in the thinking process and process information in such a way that learning material can be stored longer in students' memory. This is in line with the opinion that the problem-solving learning model can improve concept mastery because in learning students hold discussions to solve problems and build concepts through the problems raised in student worksheets (Handayani et al. 2018).

Problem-solving learning also trains students to solve problems and build their own knowledge and understanding of the material being studied. The good effect of problem-solving learning on students' mastery of biological concepts occurs because, during the learning process, students are motivated to examine the material and knowledge in-depth by themselves through reading activities, formulating answers in solving problems, and summarizing individual subject matter in the Biology material being studied. This is in line with the opinion which states that Problem-solving processes provide opportunities for students to take an active role in learning, looking for, and finding their own information and processed into concepts, principles, theories, or conclusions (Subekti, 2017).

Through problem-solving model learning that is carried out, students carry out the learning process to solve problems by trying to find information and then linking it with the problems posed in the end from these activities students can construct their own concepts and theories regarding the material being taught. This is in line with the opinion of Sadiqin et al. (2017) who states that students' understanding of science concepts and reasoning abilities develops with problem-solving models because students are trained to sort and connect declarative and procedural knowledge when solving problems.

The results of this study have proven that problem-solving learning can have a positive impact on students 'ability to solve problems and build their own knowledge. These results indicate that problem-solving learning has a better effect on students' mastery of biological concepts than learning without problem-solving or conventional learning. The results of this study are in line with several previous research results, including research conducted by Sadiqin et al. (2015); Febriyanti et al. (2017), and the research of Iqbal et al. (2018), which generally found that problem-solving learning was effective and had a positive effect on students' mastery of concepts in science learning such as biology and physics. Likewise from the aspect of learning outcomes, The results of this study support the results of several previous studies, namely research by Khairani & Safitri (2017) & Sari (2013) who explain the results of research related to the effect of problem-solving learning on student learning outcomes, where problem-solving learning affects student learning outcomes.

Based on the research results, the proposed hypothesis is accepted, indicating that the research results obtained to strengthen the opinions of the experts as well as indicate an increase in the mastery of concepts and student learning outcomes about biology in the material being taught. Mastery of biological concepts and learning outcomes are obtained in the process of implementing problem-solving learning, namely by providing the widest possible opportunity for students to construct their thoughts in solving/answering questions so that the process will give birth to a better level of mastery of concepts and student learning outcomes.

Learning problem-solving in this study, when viewed from the characteristics of the student subject has several advantages. These advantages include: 1) increasing student understanding through problem-solving activities, 2) providing learning satisfaction to students in participating in learning activities, 3) giving students the opportunity to achieve a broader understanding and analyze more deeply about a topic and linking with students' real life 4) providing opportunities for

students to develop creative, critical, responsible, and independent attitudes. This is in line with the opinion of Sanjaya (2007) regarding the advantages of the problem-solving learning model, namely 1) it is a pretty good technique to better understand the content of the lesson.

Based on the application review, it can be said that problem-solving learning is a learning model/approach that has a good influence on the mastery of concepts and learning outcomes for students. This causes students to be actively involved in organizing and finding information (knowledge), and not only passively accepting the knowledge provided by the teacher. Thus, in learning, it is necessary to pay attention to the level of student involvement in organizing subject matter and knowledge. This is in line with the opinion; Pinahayu (2017). which states that problem-solving learning is a model that involves active students optimally, allowing students to explore, observe experiments, investigate,

The results of the initial test of concept mastery and research subjects with the mean value between the experimental group and the control group were not significantly different. In simple terms, it can be said that the average pre-test ability between the experimental class and the control class before being given treatment in solving questions or tests has the same ability level. Based on the initial results (pretest) and final results (posttest), it can be said that learning with a problem-solving model in biology subjects has a very good effect on the mastery of concepts and student learning outcomes about biology at class VIII SMP Negeri 16 Palu.

These results cannot be separated from the active role and ability of the teacher in learning. These results also show that the effectiveness of learning in a learning process emphasizes the level of the teacher's ability to manage learning and the level of teacher mastery of learning strategies and the level of time suitability used during the process. In this case, during the Covid 19 pandemic, it was the maximum effort made by the teacher in overcoming various learning problems that were in fact more complex. The teacher tries his best to solve the problem of the implementation of learning in the limitations of the supporting infrastructure owned by students. This is in accordance with the opinion of Pinahayu (2017), that the success of problem-solving learning that produces better learning outcomes is by maximizing the role of the teacher in learning, providing learning motivation to students to be active in learning. The teacher also must really master and understand the steps of learning so that they can organize the role of students in the learning carried out.

The implementation of learning cannot bring students to school with the fact that there are students who do not have laptops or cellphones which should be the main infrastructure in online learning (in the network). Overcoming this problem, the teacher tries to teach students by forming study groups of 2 to 3 students whose living quarters are close together to be able to do learning together by utilizing 1 (one) cellphone and laptop owned by one of the students from the group which of course keeps paying attention to health protocols.

Things that need serious attention in online learning are students who have to use their parents' cell phones. In this case, students can take part in learning after their parents have finished using their cellphone. This condition makes the learning process sometimes unable to start according to the existing schedule. Another technical problem faced by teachers in research with problem-solving learning and online lectures is the limited funds for students and parents to provide internet packages so that teachers take steps to spend personal funds in implementing learning. This makes the costs used by the teacher in learning higher. In this case, Taradira et al. (2020) explained that the main factor which was obstacle to online learning during the Covid 19 pandemic was the lack of facilities owned by students when learning online because not all students have smartphones or computers as learning media using online. It was further explained that another factor was the internet package which was not accessible to all students (Taradira et al., 2020).

In general, the implementation of problem-solving model learning that has been carried out is basically attractive to students. The teacher is able to create a learning atmosphere which for students is a new learning condition so that it can attract students' interest and attention in participating in learning.

The effect of concept mastery on student learning outcomes

This research, apart from looking at the effect of problem-solving model learning on students' mastery of concepts and learning outcomes of biology, also tries to examine the effect of conceptual mastery on student learning outcomes. This is stated in the 3rd working hypothesis, namely

"there is an effect of conceptual mastery on student learning outcomes about biology in class VIII SMP Negeri 16 Palu". To prove this hypothesis, the data were analyzed using simple regression analysis.

The results of the regression analysis in Table 4:14 (model summary) show the relationship between the independent variable X (concept mastery) and the variable Y (learning outcomes). Through the R-value (Pearson correlation) which is 0.343, it can be explained that the correlation between conceptual mastery and students' learning outcomes about biology at class VIII SMP Negeri 16 Palu is in a weak relation because the R-value is more likely to be close to 0. The strength of relationship is strengthened by the value of R square (R^2) which is only 0.118 which, when presented, shows the relationship between concept mastery and students' biology learning outcomes is only 11.8%, which means that 88.2% of learning outcomes are influenced by other factors outside the conceptual mastery factor. However,

These results can be seen in the results of analysis of variance (ANOVA) Table 4.15, where the value of Fcount = 6.679 with a probability value of 0.013 <α (0.05) is obtained, which means that there is an influence of the concept mastery independent variable (X) on the dependent variable learning outcomes (Y). This result is in line with Astuti's (2017) explanation which states that conceptual mastery can increase students' intellectual proficiency and help solve problems and lead to meaningful learning that can affect student learning outcomes.

The results of the analysis of the correlation between concept mastery and learning outcomes in Table 4.14 are weak. This shows that student learning outcomes about biology at class VIII SMP Negeri 16 Palu are not only influenced by the students' mastery of concepts (reasoning abilities) but are also influenced by several other factors. There are many factors that influence student learning outcomes. This is in line with Rusman (2010) explaining that student learning outcomes can be influenced by several internal factors, including physiology including students' physical conditions such as physical and spiritual health, and psychological aspects including interests, talents, motivation, and cognitive abilities. Furthermore, Rusman (2010) states that other factors that affect student learning outcomes are external factors, namely the physical environment and the social environment of students, and also instrumental

factors that are designed according to the expected learning outcomes of students. In this study, one of the factors that influence student learning outcomes is the instrumental factor used, which is related to the learning process carried out (problem-solving) and the suitability of the test instruments used with the learning objectives that have been set. Problem-solving learning is thought to be able to encourage student motivation in participating in learning. One of the factors that influence student learning outcomes is the instrumental factors used, which are related to the learning process carried out (problem-solving) and the suitability of the test instruments used with the learning objectives that have been set. Problem-solving learning is thought to be able to encourage student motivation in participating in learning. One of the factors that influence student learning outcomes is the instrumental factors used, which are related to the learning process carried out (problem-solving) and the suitability of the test instruments used with the learning objectives that have been set. Problem-solving learning is thought to able to encourage student motivation in participating in learning (Yanti, 2017).

Referring to this opinion, it can be explained that the possible factors that determine the good results of student learning in this study are the instruments used in measuring student learning outcomes that are in accordance with competencies and indicators and learning objectives to be achieved. This can be seen from the item content of the learning outcomes. It can be seen that all of the item items used to measure student learning outcomes are in great agreement with the competencies and learning objectives that have been set. It can also indicate the success of learning that is carried out, namely the problem-solving model. This is in line with the opinion of Ferazona (2017) which states that measuring the success of students in following the learning process can be done through an evaluation process using the right questions or evaluations according to the indicators that have been compiled. Evaluation instruments must be in accordance with basic competencies so that the expected competencies can be achieved.

From the results of the regression analysis carried out, a constant value (a) of 50.592 is obtained and it is positive, which means that student learning outcomes will be 50.592 ≈ 50.6 if the mastery of the concept of 0 (zero). This constant reinforces the results of the analysis of the correlation between concept mastery and previous

learning outcomes. This happens because student learning outcomes are not influenced by concept mastery alone, but are also influenced by other factors. In this case, student learning outcomes are influenced by the learning process carried out which makes learning interesting and fun for students.

Learning outcomes in this study are also influenced by the test instruments used that are in accordance with the competencies and indicators and objectives that have been set. The correlation between concept mastery and learning outcomes is in the weak category. This can be seen from the regression coefficient (b) of the concept mastery of 0.362 which is positive. These results indicate that the increase in student learning outcomes is only 0.362 if the mastery of the concept has increased by 1 point. These results are in line with the explanation that student learning outcomes are influenced by several factors, both internal and external (Rusman, 2010).

Student response to problem-solving learning

Student responses to problem-solving model learning in this study were obtained from the results of a questionnaire given to students who received the problem-solving learning treatment. The questionnaire used in this study consisted of 40 questionnaire statement items with 5 answer choices, namely strongly disagree with a score of 1 (one), disagree with a score of 2 (two), doubt score 3 (three), agree with a score of 4 (four) and strongly agree with a score of 5 (five).

The results of the descriptive analysis for the categories or criteria for the level of student response to the application of problem-solving learning to the mastery of concepts and student learning outcomes about biology in class VIII SMP Negeri 16 Palu are in positive criteria, meaning that the average value of student responses has reached ≥ 60%. This can be seen in the acquisition of the average value of student responses as research subjects which is 100% agreeing with the applied problem solving learning.

The results of the percentage of these criteria indicate that the level of student response in participating in the learning process is also determined by the level of desire/willingness, enthusiasm, and enthusiasm for following the learning material. This will also have an impact on the ability to master concepts and learning outcomes achieved in each learning process. Learning innovations that are carried out make the learning process fun for students and make students

excited about learning through problem-solving activities. This is in accordance with the opinion of Mustapa (2009), that in learning two things will be found, namely if students feel happy, they will be passionate and excited, on the other hand, if students feel unhappy, they will not be passionate about learning and will experience difficulties. It is further explained that when an object is lived in as something valuable, a feeling of pleasure will arise and vice versa if an object is lived in as something that is not valuable or useful, then a feeling of displeasure will arise. In this case, learning activities by solving problems are new and considered important by students. For instance, Placing students as learning subjects, providing new learning experiences for students, and making students active in learning. Conversely, in conventional learning with the lecture method, students do not find a significant challenge in learning, the role of students is very passive, and learning tends to be boring and less fun for students.

The result of the response questionnaire was that 100% of students agreed to the application of problem-solving learning used in this study. These results indicate that students show a positive response, which supports the data on conceptual mastery and learning outcomes, especially on post-test results. These results indicate that students have a high willingness. Mustapa (2009) states that this positive response will support learning because it can lead to positive responses, and this will lead to high desire/willingness and further motivation to develop easily. Conversely, a negative response will be able to hinder learning because it does not generate positive responses and does not support the desire/will and motivation will be difficult to develop. The positive response of these students more specifically shows how big the level of student response to problem-solving learning. To what extent students feel an interest in understanding the content of learning with their needs. To what extent students feel satisfied with the learning activities that have been carried out or passed, as well as to what extent students feel confident in their ability to do learning tasks and their confidence in taking the final test of learning.

Conclusions

The application of the problem solving model has an effect on the mastery of conceptabout biology at class VIII SMP Negeri 16 Palu. The application of the problem solving model has an

effect on students' learning outcomes about biology at class VIII SMP Negeri 16 Palu. Mastery of concepts affects students' learning outcomes about biology at class VIII SMP Negeri 16 Palu.

Acknowledgments

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