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The Influence of the Problem Based Learning Model Assisted by Booklet Media on the Understanding Conceptual Ability of Class V Elementary School Students on Water Cycle Material

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Abstract: This research aims to determine the effect of the problem based learning model assisted by booklet media on the understanding conceptual ability of fifth grade elementary school students in the water cycle material at SDN 03 Dungun Laut, Jawai District for the 2023/2024 academic year. The type of research used was quantitative research using a quasi experimental design method with a post-test only control group design. The population of this study was all class V students at SDN 03 Dungun Laut, totaling 40 students. The sample for this research was class V with a total of 40 students consisting of class VA with 18 students as the experimental class and class VB with 22 students as the control class. The collection techniques used in this research were test and non-test techniques. The tests used were post-test questions, while non-tests used student response questionnaires, and observation sheets on the implementation of learning activities. The data analysis techniques in this research were the two independent sample t-test, effect size test, and descriptive percentage analysis. The results of the research showed that: (1) There was a difference in students' conceptual understanding between classes that use the problem based learning model assisted by booklet media and classes that are given a direct learning model on water cycle material in class V SDN 03 Dungun Laut with $t_{count} = 2.462 > t_{table} = 2.024$; (2) The influence of the problem based learning model assisted by booklet media on students' science understanding conceptual ability was 0.4 with medium criteria; (3) The implementation of the problem based learning model assisted by booklet media in science learning for class V elementary school was classified as very good with a percentage of 90%; (4) Students response were positive to the problem based learning model assisted by booklet media in science lessons for class V elementary school was 81% with very good criteria. So it could be concluded that the problem based learning model assisted by booklet media had an influence on students' understanding conceptual ability of Natural Science (IPA) in class V water cycle material at SDN 03 Dungun Laut.

Keywords: Problem Based Learning Model, Booklet Media, Understanding Conceptual Ability

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PRELIMINARY

Natural science or what is often called science in Indonesian is also known as science. The word science comes from the English "Natural Science" natural which means natural or natural relating to nature, while from the word science which means "knowledge". So natural science can be interpreted as natural science (IPA). Natural Sciences is one of the subjects that students must study. The scope of science relates to daily life and what is in the surrounding environment, starting from natural phenomena to symptoms of the formation of objects (Sari and Sumarli, 2019). According to Murdani and Sumarli (2019), science is related to how to know nature systematically, so that science is not only about mastering a collection of knowledge in the form of facts, concepts or principles, but is also a process of discovery. It is hoped that science education can become a vehicle for students to learn about themselves and the natural world around them, as well as prospects for further development in applying it in everyday life.

Based on the implementation of the 2013 curriculum, science learning activities are developed using a scientific approach (measuring, observation, inference, prediction, classification, communication) and other science process skills. The 2013 curriculum emphasizes modern pedagogical dimensions in learning, namely using a scientific approach. The scientific approach in learning as intended includes observing, asking, reasoning, trying, forming networks for all subjects (Daryanto, 2014). In the 2013 curriculum, students are required to actively seek information and build their own knowledge. One of the results obtained by students in learning science is the ability to understand concepts. With this learning, it will be easier for students to understand the concepts in science learning (Rosdianto et al., 2017; Murdani and Sumarli, 2019). This shows that science learning can be used as a vehicle for training students' conceptual understanding abilities.

According to Herlina et al, (2019) conceptual understanding is a student's ability to understand the meaning or concept, re-express the concept in a more understandable form, and be able to apply it. When students understand the concept of science, they will easily solve problems in learning science. Because basically conceptual understanding is students' ability to understand a concept about everyday phenomena based on experience and observations which are then connected to concepts that previously existed with them (Sari et al., 2016). Students' correct understanding of concepts will make it easier for

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students to develop reasoning skills and explain science concepts in everyday life. However, in science learning there are still many students who do not understand the concepts of the material provided, so students feel that science lessons are difficult lessons (Riananda and Nurdyansyah, 2017). This can result in student learning outcomes being low. If students have a low understanding of concepts, they will tend to experience failure in learning science. Students' low understanding of concepts can cause students to give different answers to the same question (Bjorklund and Pramling, 2017:68). Teachers do not pay attention to students' activeness, understanding and interest in the ongoing learning process (Sumarli, 2018).

Based on the results of pre-research carried out by analyzing the answers to students' worksheets for the Final Semester Assessment in science subjects class V at SD Negeri 03 Dungun Laut for the 2023/2024 academic year as many as 45 students (V A 23 students and V B 22 students), it was found that students' ability to understand concepts was still low. Of the 45 students, 29 students (64.4%) answered the PAS question incorrectly, which is a question of understanding the concept of explaining indicators. 24 students (53.3%) answered incorrectly on interpreting indicator questions, 23 students (51.1%) answered incorrectly on exemplifying indicator questions, 25 students (55.56%) answered incorrectly on classifying indicator questions.

Based on the results of interviews conducted with class V teachers at SD Negeri 03 Dungun Laut, information was obtained that in the science learning process students tend to memorize a concept so that students have difficulty building their own understanding of the concept. When given the opportunity to ask questions, students are passive. The learning models that are often used in the learning process include direct learning models, lecture methods and assignment methods which tend to make students less active in learning activities. This shows the lack of student response to the learning carried out. Apart from that, the science learning process that is carried out does not use media that can clarify the subject matter. The use of media in science learning is expected to help the smooth and effective achievement of learning objectives, because media can improve the quality of the learning process. The problem of students' low understanding of concepts needs to be sought for a solution so that learning can achieve maximum results and is able to increase students' conceptual understanding.

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One solution that can be used to overcome this problem is to use the Problem Based Learning model. The problem based learning model is a learning concept that helps teachers create a learning environment that starts with problems that are important and relevant (relevant) for students, and allows students to gain a more realistic (real) learning experience (Sofyan et al, 2015: 49). The existence of experiments in learning can provide special experiences for students in understanding natural phenomena around them (Sumarli et al., 2017). Therefore, the application of the Problem Based Learning Model helps students more easily understand the concepts being studied. The problem based learning model has advantages, including: (a) students are involved in learning activities, so that their knowledge is really well absorbed, (b) students are trained to collaborate with other students, and (c) students can gain knowledge and skills from various sources. source (Sofyan et al, 2015:63). Apart from that, according to Kono (2016), the problem based learning model is a learning process based on a problem with the aim of students understanding a concept through problems.

To maximize the application of the Problem Based Learning model, it is necessary to choose appropriate learning media that is appropriate to the material or concept being taught. One of the media that can be used in Problem Based Learning model learning is booklet media. Using booklet media can make students interested in learning, because booklets are designed to be unique and attractive, contain the essence of material that is appropriate to the learning resource, visualization is more dominant with pictures, and are more flexible to carry anywhere because of their small size (Siyamta, 2014) . This media has a very important role in learning as an intermediary or introduction to the material presented so that it can be understood well by students. It is hoped that this booklet media can help maximize the application of the Problem Based Learning model to improve students' ability to understand concepts in science learning on the water cycle.

The material studied in this research is the water cycle. This is because the water cycle material contains many concepts that students must understand well in order to move to the next level. The concepts in this water cycle material contain concepts that students must understand, namely: the concept of the water cycle, the concept of the various types and stages of the water cycle, and the concept of the water cycle process. Several results of previous research regarding the application of the Problem Based Learning model in learning, including the results of research by Kurniawan et al (2020)

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which shows that there is a significant difference in the understanding of concepts in fifth grade elementary school students in science subjects between groups of students taught with the media-assisted Problem Based Learning model. audio visual with students who are taught without using the Problem Based Learning model assisted by audio visual media, as well as the Problem Based Learning model assisted by audio visual media can improve understanding of concepts in science learning. Apart from that, the research results of Andraeni et al (2021) also show that the Problem Based Learning model assisted by fraction and geometry board media has an effect on Understanding Mathematical Concepts.

Based on the description of the problem, the researcher is interested in conducting research with the title "The Influence of the Problem Based Learning Model Assisted by Booklet Media on the Ability to Understand Concepts of Class V Elementary School Students on Water Cycle Material". It is hoped that this research will influence students' ability to understand concepts in the water cycle material, as well as students providing positive responses to the learning model applied. Based on the background above, the general objective of this research is to describe the influence of the Problem Based Learning model assisted by booklet media on the ability to understand concepts of fifth grade elementary school students in the water cycle material.

METHOD

The type of research used is quantitative research using a quasi experimental design method with a post-test only control group design. This research was conducted at SD Negeri 03 Dungun Laut, Dungun Laut Village, Jawai District, Sambas Regency, West Kalimantan, namely in the even semester of the 2023/2024 academic year. The population in this study was all class V students at SDN 03 Dungun Laut, totaling 40 students. Samples were taken using a saturated sampling technique, after sampling those selected were the experimental class VA class, namely the experimental class which used the problem based learning model assisted by booklet media and the VB class or control class used the direct learning model. The collection techniques used in this research are test and non-test techniques. The test used is a post-test in the form of an essay with 7 questions, each question contains 1 indicator of the ability to understand concepts, while the non-test uses a student response questionnaire and an observation sheet on the

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implementation of learning activities. Data analysis tests in this research, both to test normality, homogeneity and the two-sample t test, will be processed using Microsoft Excel to describe differences in students' understanding of concepts between classes that use the problem based learning model assisted by booklet media and classes that are given a direct learning model in science learning. fifth grade elementary school, and the next data analysis test is hypothesis testing with the aim of testing whether there is a clear and reliable influence between the independent variable and the dependent variable, which in the end will draw a conclusion in the form of acceptance or rejection of the hypothesis that has been formulated, namely by using effect size, as well as a descriptive percentage analysis test to describe the implementation of the Problem based learning model assisted by booklet media in science learning for class V elementary school and to describe student responses after implementing the Problem based learning model assisted by booklet media in science learning for class V elementary school.

RESULTS

Based on the results of the research that has been carried out, data was obtained in the form of post-test scores, student implementation observation sheets, and student response questionnaires, resulting in the following data:

1. Test the average of the experimental class and control class

To determine the difference in students' ability to understand science concepts between the experimental class and the control class in the water cycle material for class V SDN 03 Dungun Laut using a two-sample t test. However, normality and homogeneity tests will be carried out first. The normality and homogeneity tests are as follows.

a) Normality test

The normality test carried out in this study was to determine whether the post-test data scores that had been collected were normally distributed or not. The results of the post-test data normality test analysis of the ability to understand science concepts of experimental class and control class students can be seen in table 1 as follows.

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Table 1 Data Normality Test Calculation Results

Statistics	Class	
	Experiment	**Control**
X^2_{count}	5,898	6,131
Number of Studets (n)	18	22
Difficulty Level (α)	5%	5%
X^2_{table}	7,814	7,814
Decision	H_0 accepted	
Conclusion	Normal	

From table 1 above, it can be seen that the results of the data normality test calculations in the experimental class showed that x^2_{count} was 5.898 and x^2_{table} was 7.814. Because $x^2_{count} \leq x^2_{table}$, namely 5.898 ≤ 7.814, the data is normally distributed. Meanwhile, the results of the data normality test calculations in the control class showed that x^2_{count} was 6.131 and x^2_{table} was 7.814. Because $x^2_{count} \leq x^2_{table}$, namely 6.131 ≤ 7.814, the data is normally distributed. Because the experimental class and control class are normally distributed, the f formula is used to determine data homogeneity.

b) Test data homogeneity using the f formula

After the post-test score data for the experimental and control classes are calculated and the data is normally distributed, the next step is to test the homogeneity of the data using the f formula. The results of the homogeneity test calculation can be seen in table 2 as follows.

Table 2 Homogeneity Test Calculation Results

Statistics	Class	
	Experiment	Control
Varians (s^2)	173,82	152,66
X^2_{count}	1,139	
Number of Students (n)	18	22
Difficulty Level (α)	5%	5%
X^2_{table}	2,139	
Decision	Ha accepted	
Conclusion	Homogeneous	

Based on table 2 above, it can be seen that the data calculation uses the f formula. It is known that the experimental class variance is 173.82 and is the largest variance, while the control class variance is 152.66 and is the smallest variance so that the f_{count} is 1.139. From the f table with α= 5% and dk in the numerator 17 and dk in the denominator 21, we get f_{table} = 2.139. Because $f_{count} < f_{table}$, namely 1.139

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< 2.139, the experimental class and control class have homogeneous or the same variance. Because the value data in the experimental class and control class were distributed normally and homogeneously, a two-sample t-test was carried out to determine whether there was an influence on students' science concept abilities between classes given the PBL model assisted by booklet media and classes given direct learning on the material. class V water cycle SDN 03 Dungun Laut.

c) Test the difference between the experimental class and the control class using the two-sample t test

Based on normality and homogeneity tests, it is known that the post-test data for the experimental class and control class are normally distributed and have the same variance or uniform variance. Therefore, to test the similarity of the averages of the two classes, a two-sample t-test was used. Following are the results of the two sample t-test calculations which can be seen in table 3 as follows.

Table 3 Two Sample T Test Calculation Results

Statistics	**Group**
	Experiment and Control
Dk	38
α	5%
t_{count}	2,462
t_{table}	2,024
Decision	H_a accepted
Conclusion	There are differences in abilities

Based on table 3 above, it is known that tcount = 2.462 and ttable = 2.024, it is obtained that $t_{count} > t_{table}$, namely 2.462 > 2.024, so Ha is accepted and H0 is rejected. Therefore, it can be concluded that there are differences in the ability to understand science concepts between classes given the problem based learning model assisted by booklet media with direct learning on the water cycle material for class V SDN 03 Dungun Laut. Because there are differences, there is an influence on students' ability to understand science concepts between classes given the problem based learning model assisted by booklet media and direct learning on the water cycle material for class V SDN 03 Dungun Laut.

2. Test how much influence the problem based learning model assisted by booklet media has on students' ability to understand science concepts using Effect Size

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After carrying out a two-sample t test, it was discovered that the results of the problem based learning model assisted by booklet media had an effect on students' ability to understand science concepts. Next, to find out how much influence the problem based learning model assisted by booklet media has on students' ability to understand science concepts, the Effect Size formula is used. The results of the Effect Size calculation can be seen in table 4 as follows.

Table 4 Recapitulation of Effect Size Test Results

Class	Average Value	Class Standard Deviation
Experiment	56,15	24,92
Control	46,10	
ES	0,4	
Criteria	Currently	

Based on table 4, it is known that the calculation results of Effect Size = 0.4 with medium criteria, namely $0.2 < ES \leq 0.8$. So it can be concluded that the PBL model assisted by booklet media has an influence on students' ability to understand science concepts in the water cycle material, namely 0.4, including the medium criteria.

3. Observation results of the implementation of the problem based learning model assisted by booklet media.

The implementation observation sheet carried out in this research was to determine the implementation of learning using the PBL model assisted by booklet media on the water cycle material. Observations were carried out using an observation sheet that had been prepared, where all the indicators observed in this research were developed from each step of the PBL model assisted by booklet media which was carried out in two meetings conducted by 3 observers or observers, namely two students. and one teacher. The results of the research data analysis on the implementation of the PBL model assisted by booklet media are shown in table 5.

Table 5 Recapitulation of the Implementation of the Problem Based Learning Model Assisted by Media Booklet

Implementation Observation Results	Meeting 1			Meeting 2		
	Observer			Observer		
	I	II	III	I	II	III
Percentage of each meeting	90% (Very Good)	86% (Very Good)	85% (Very Good)	98% (Very Good)	89% (Very Good)	90% (Very Good)
Average percentage per meeting	87% (Very Good)			92% (Very Good)		
Overall percentage	90% (Very Good)					

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From table 5 above, it can also be depicted in a bar diagram that the implementation of the problem based learning model assisted by booklet media can be presented in figure 1 as follows.

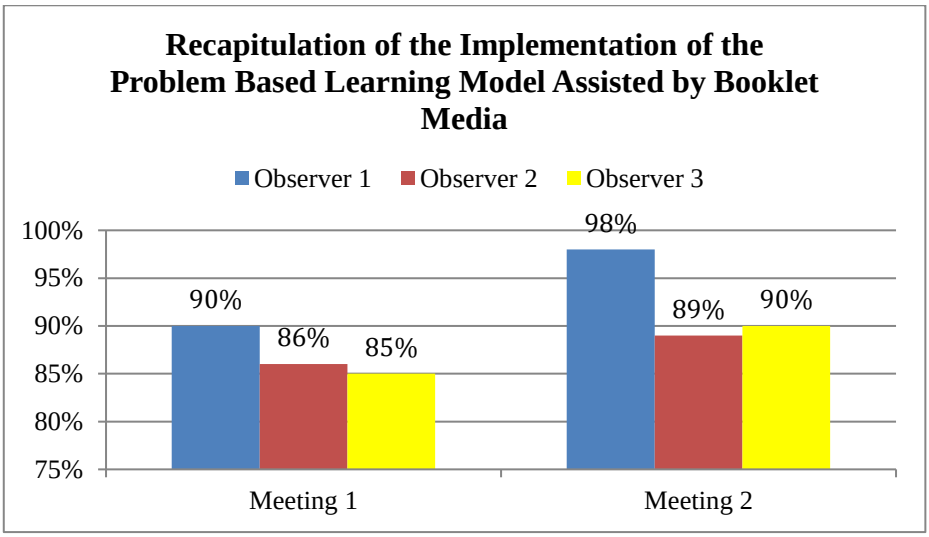

Figure 1 Diagram of the implementation of the problem based learning model assisted by booklet media

Based on table 5 and figure 1 above, it shows that observations of implementation at the first meeting which contained twenty activities obtained a percentage of 87%, while at the second meeting which contained twenty activities the percentage was 92%. Then looking at the percentage of 90%, the implementation of the problem based learning model assisted by booklet media is categorized as very good.

4. Student Response Questionnaire Results

Student responses to the PBL model assisted by booklet media on the water cycle material can be obtained using a student response questionnaire sheet which was distributed to all students in the experimental class with a total of 19 students. Research data is presented in the form of responses to questions included in the student response questionnaire. Based on the results of the analysis of student responses, the criteria for student response questionnaires that were answered can be seen in table 6 as follows.

Table 6 Percentage Results of Student Response Questionnaires

Percentage (%)	Criteria	Number of Students
0% < P < 25%	Bad	0
25% ≤ P < 50%	Enough	2
50% ≤ P < 75%	Good	4
75% ≤ P ≤ 100%	Very Good	12

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Based on table 6 above, the results of the percentage of student response questionnaires can be explained that students who are in the percentage group 0% < P < 25% with poor criteria are 0, students who are in the percentage group 25% ≤ P < 50% with adequate criteria are 2, students Those in the percentage group 50% ≤ P < 75% with good criteria are 4, and students who are in the percentage group 75% ≤ P < 100% with very good criteria are 12, because many students fall into the good, very good and average criteria. The overall student response was 81% with very good criteria. Thus, students can be said to have a positive response to science learning using the problem based learning model assisted by booklet media on the water cycle material. The detailed calculation results of the results of the analysis of student response questionnaires can be found in table 7 as follows.

Table 7 Percentage of Student Responses

Student Code	Amount	Percentage of Student Responses
E-01	16	100%
E-02	8	50%
E-03	9	56%
E-04	7	44%
E-05	14	88%
E-06	16	100%
E-07	10	63%
E-08	16	100%
E-09	16	100%
E-10	13	81%
E-11	16	100%
E-12	13	81%
E-13	15	94%
E-14	16	100%
E-15	7	44%
E-16	16	100%
E-17	10	63%
E-18	14	88%
Total Number	232	
Average Percentage	81%	
Category	Very Good	

DISCUSSION

1. Differences in students' ability to understand science concepts

Researchers conducted research at SDN 03 Dungun Laut which included 2 classes, namely the experimental class and the control class. The experimental class

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came from class VA with 18 students, while the control class from class VB totaled 22 students. The experimental class received a problem based learning model assisted by booklet media, while the control class received a direct learning model.

After conducting the research, the researcher gave a test in the form of post-test questions to students to see the effect on students' ability to understand science concepts. Next, the researcher calculated the students' post-test results to see whether the experimental class that received special treatment, namely by applying the problem based learning model assisted by booklet media, obtained better results than the control class that received direct learning model treatment. The problem based learning model assisted by booklet media was developed to make it easier for students to understand and raise difficult problems through discussion.

This is in line with research results (Kurniasih and Sani, 2016:18) that a model that is suitable for use as an innovation to improve students' science learning outcomes is by using the problem based learning model. This statement is supported by research results (Putri, 2018) The influence of the problem based learning learning model assisted by image media on science learning outcomes has a significant influence on the science learning outcomes of students who are taught using the problem based learning learning model and students who are not taught using the model. Problem based learning in elementary school students.

Based on the results of calculating the students' post-test data, it was found that $t_{count} > t_{table}$, namely 2.462 > 2.024, so there was an influence on students' ability to understand science concepts between classes given the problem based learning model assisted by booklet media with direct learning on water cycle material for class V SDN 03 Dungun Laut. This is in line with the results of research (Pritikasari et al, 2021), namely based on the results of research and discussions regarding the multimedia-assisted problem-based learning model on students' collaboration abilities, that there is an influence of the multimedia-assisted problem-based learning model on students' collaboration abilities. This effect was demonstrated after students participated in the learning process using the problem based learning model assisted by multimedia, so that students' collaboration abilities became better.

2. The influence of the problem based learning model assisted by booklet media on students' ability to understand science concepts

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To determine the calculation of the influence of the problem based learning model assisted by booklet media on students' ability to understand science concepts, the Effect Size formula can be used. Based on the results of the Effect Size calculation, it was found that the average post-test score for the experimental class students was higher, namely ($\bar{x}$ = 56.15) and the control class, namely ($\bar{x}$ = 46.10), so there was a difference of (10.05). As for the standard deviation of the control class, namely (24.92), it was found that the problem based learning model assisted by booklet media had a significant effect on students' ability to understand science concepts with medium criteria, namely 0.4.

This is in line with the results of research (Rivaldi et al, 2018) based on the results of data analysis calculations carried out showing that the average score of students who took part in learning using the Problem based learning model assisted by Audio Visual ($\bar{x}$ = 84.27) and students who took part in learning conventional ($\bar{x}$ = 72.70) has a difference of 11.57. Thus, there is an influence on the mastery of science knowledge competencies between students who take part in learning using the Audio Visual assisted problem based learning model and students who take part in conventional learning. So it can be concluded that the problem based learning model in this research has a significant influence on the learning process.

3. Implementation of the problem based learning model assisted by booklet media

To find out the calculation of the implementation of the problem based learning model assisted by booklet media, the formula for the percentage of frequency of implementation can be used. Based on the calculation results at the first meeting, the results of learning implementation were obtained with very good criteria. At the beginning of the meeting, when students were appointed to pair up by looking for a friend they liked, the students were very enthusiastic and immediately said the name of their friend they liked.

Likewise, for the second meeting, the results of the implementation of the criteria were very good. When students are given the task of reading a passage and then writing questions related to the main problem that arises from the reading, the student is starting to get used to it and has the courage to provide answers to the questions given to him. So, from the data on the percentage of implementation of the problem based learning model assisted by booklet media from 16 categories,

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implementation results were obtained with very good criteria. This shows that the implementation of the problem based learning model assisted by booklet media during learning is at very good criteria. This means that science learning using the problem based learning model assisted by booklet media can be carried out well in the water cycle material in class V at SDN 03 Dungun Laut. So it can be concluded that science learning was carried out very well using the Problem based learning model assisted by booklet media and can be seen through the observation sheet of the implementation of the Problem based learning model assisted by booklet media.

The results of research (Harizon et al, 2015) state that the results of the implementation of the problem based learning model by teachers are categorized as very good with an average percentage of 87.96%. So it can be concluded that the implementation of the problem based learning model in this research can be carried out very well.

4. Results of analysis of student responses

Students' responses to science learning using the problem based learning model assisted by booklet media showed a positive response. This is shown by the average percentage of students answering the questionnaire overall of 81%, with very good criteria. This is in line with the results of research from (Fatimah and Julianto, 2018) from the results of the analysis, it is known that there is a significant positive influence by using the problem based learning model assisted by series of images on decision making skills regarding the water cycle and its impact on events on earth and sustainability. living things. Apart from that, the response from students to the ongoing learning showed a positive response. This can be seen from the results of the questionnaire distributed to experimental class students, where the results show that they are in the good category.

From the description above, it can be concluded that learning using the problem based learning model assisted by booklet media on the water cycle material influences students' ability to understand science concepts, so that students can respond well to learning activities. This statement is in accordance with the results of research (Ramadhan et al, 2016) which states that the application of the problem based learning model assisted by multimedia to improve student learning outcomes in the water cycle and natural events material can increase students' understanding of science concepts,

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namely in cycle I there were 70%, cycle II 85 %, and cycle III becomes 100%. Thus, the application of the problem based learning model assisted by multimedia on water cycle material and natural events can improve the learning outcomes of fifth grade elementary school students.

CONCLUSION

Based on the research results and general discussion, it can be concluded that the problem based learning model assisted by booklet media has an influence on students' ability to understand science concepts in class V water cycle material at SDN 03 Dungun Laut. In particular, according to the sub-subs of the problem formulation in this research, there is a difference in students' concept understanding abilities using the problem based learning model assisted by booklet media and the direct learning model in fifth grade elementary school science learning with tcount = 2.462 while at a significance level of 5% and dk = 38, the value of ttable = 2.024 is obtained so that tcount = 2,462 > ttable = 2.024. This means that there is a significant difference in students' ability to understand science concepts between students who use the problem based learning model assisted by booklet media and students who use direct learning on the water cycle material.

The results of data analysis calculations carried out show that the average score of students who took part in learning using the problem based learning model assisted by booklet media was ($\bar{x}$= 56.15) and students who took part in direct learning ($\bar{x}$= 46.10) and had differences equal to (10.05). Thus, there is an influence of the problem based learning model assisted by booklet media on the ability to understand science concepts for fifth grade elementary school students, namely 0.4 with medium criteria.

From the results of the research that has been carried out, the results of the observation sheet show that the implementation of the problem based learning model assisted by booklet media in science learning for class V elementary school at the first meeting was 87% and at the second meeting it had increased to 92%. Thus, the application of the problem based learning model assisted by booklet media on the ability to understand science concepts for fifth grade elementary school students is classified as very good with a percentage of 90%.

Apart from that, the response from students to the problem based learning model assisted by booklet media in science lessons showed a positive response. This can be seen

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from the results of the questionnaire distributed to experimental class students, where the results showed that they were in the very good category, namely 81%.

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