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The Effect of Problem Based Instruction on Students' Learning Outcomes in Respiratory System

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Abstract: This study aims to determine whether or not there is an influence of the learning model using the problem based instruction (PBI) learning model on student learning outcomes on the respiratory system material for class XI at the Dar al-Ma'arif Islamic Boarding School. This research method uses a quantitative approach with a quasi-experimental type of research. The population in this study were students of class XI Islamic boarding school Dar al-Ma'arif. The samples used in this study were students of class XI A (experimental class) and class XI B (control class). The samples used in this study were 2 classes totaling 40 students. Sampling in this study was conducted using a random sampling technique. Sampling in this study was carried out using a random sampling technique. The results of the study were the results of student learning outcomes using the Problem Based Instruction (PBI) learning model in the control class, the highest score was obtained at 72 while the lowest score from the control class was 36 with the average score. an average of 56.2 and while the experimental class the highest score was obtained at 96 while the lowest value from the experimental class was 40 with an average score of 66.4. The experimental class has a higher score because the use of the Problem Based Instruction (PBI) learning method is easier to understand and easy for students to understand.

Keywords: problem based instruction, learning outcomes, respiratory system.

Abstrak: *Penelitian ini bertujuan untuk mengetahui ada tidaknya pengaruh model pembelajaran penggunaan model pembelajaran problem based intruction (PBI) terhadap hasil belajar siswa pada materi sistem pernapasan kelas XI dipondok pesantren dar al-ma'arif.Metode penelitian ini menggunakan pendekatan kuantitatif dengan jenis penelitian quasi eksperimen. Populasi didalam penelitian ini adalah siswa kelas XI pesantren dar al-ma'arif. Sampel yang digunakan didalam penelitian ini yaitu siswa kelas XI A (kelas eksperimen) dan kelas XI B (kelas kontrol). Sampel yang digunakan dalam penelitian ini diambil sebanyak 2 kelas berjumlah 40 Siswa. Pengambilan sampel dalam penelitian ini dilakukan dengan menggunakan teknik random sampling. Pengambilan sampel dalam penelitian ini dilakukan dengan menggunakan teknik random sampling.Hasil dari penelitian hasil dari hasil belajar Siswa dengan Penggunaan Model Pembelajaran Problem Based Intruction (PBI) di kelas control nilai tertinggi di peroleh sebesar 72 sedangkan nilai terendah dari kelas control 36 dengan hasil nilai rata rata sebesar 56,2 dan sedangkan kelas exsperimen nilai tertinggi di peroleh sebesar 96 sedangkan nilai terendah dari kelas exsperimen 40 dengan hasil nilai rata rata sebesar 66,4. Kelas eksperimen memiliki nilai lebih tinggi disebebkan karna penggunaan metode pembelajaran Problem Based Instruction (PBI) lebih mudah dipahami serta mudah dimengerti oleh siswa.*

Kata kunci: *pembelajaran berbasis masalah, hasil belajar, sistem respiratori.*

▪ INTRODUCTION

Education is a plan that is used consciously by the community to achieve an effective way of learning, with the aim of educating students to develop their potential, In a the thing that historical education begins in an activity for students that continues throughout life (long life education). In the way of an education that has been widely

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known and taught in a teaching educational institution, that is, it is possible to achieve a process of maturity in students so that they are able and have determined a decision independently and are responsible for it. This concept is operationally applied to formal education by providing a broad insight into the future (Utama & Sukaswanto, 2020).

The same is true according to opinion (Lathif, 2013). Educational institutions also have a main role that is useful in providing resources to very good and quality human beings. In this case, it will be achieved if the implementation of a teaching and learning process is carried out effectively so that the results in education can also be achieved optimally. The results of learning in students can be seen from the results of the achievement of learning values that have been obtained. Achievement results from learning can also reflect on a result of the acquisition of activities for the teacher, and the ability, knowledge, of students and knowledge of students on the subjects to be taught to be able to produce good learning outcomes is not an easy thing, but it really takes some effort.

Success in formal education can certainly lead to success in implementing a teaching and learning outcome. more detailed matters on an activity in teaching and learning activities are very closely related to the integration of a link between teachers and student activities. This teaching and learning activity is completely inseparable from the whole system in education, for that it can improve a quality in learning and teaching can be carried out with various efforts and efforts on the teacher, namely: how to teach, use appropriate learning models, and classroom management management, to assessment of a way of teaching and learning on the results of lesson values, application of understanding to the pattern of teaching and learning activities (Main & Sukaswanto, 2020).

Learning is an effort in students, students can provide assistance to students and teachers so that they can learn more easily. In carrying out the lesson there is a goal that can be achieved. in this lesson, namely the merging of a component in the lesson that can have integrity with each other and interact, therefore if one component is not integrated, then in this case the way of implementing the lesson will face many obstacles that will thwart the achievement of goals in learning and learning outcomes. One of the components in the learning process is the teacher (Robiyanto, 2021). Therefore, the learning process is one of the interrelated relationships between teachers and students in the scope of the lesson. The teacher is a guide in a learning process and also as someone who plays an important role in the world of education. Teachers should be more creative and innovative in creating a fun and interesting learning scope, then students can understand the learning that will be given to the teacher (Kurniati et al., 2021).

Teachers also need to improve their skills in teaching then students can maximize their learning even though in reality most teachers still use models in old learning. Teacher expertise is one of the efforts to improve quality in school education where the teacher is an element in the school that is significantly Directly and actively interacts with students, expertise is expertise in teaching by using a learning model so that it can be efficient, effective and appropriate (Robiyanto, 2021). Biology is a science that studies the life of living things and their environment. Biology is very important for us to learn. Because in learning biology we can understand and know the function of organs in the body and their structure. This will make humans to maintain health with healthy living behavior in the body and Biology is also a branch of natural science that studies the ins

and outs of activities. Therefore, it is not surprising that Biology learning is more rote than counting (Renat et al., 2017)

Curriculum 2013 prioritizes a skill and character education and understanding. Students can be required to be able to understand the material, active in discussions and presentations and has a polite and courteous nature as well as good discipline. in the 2013 curriculum also uses a scientific approach that refers to finding a basic concept that has underpinned something in applying the learning model (Janah et al., 2018). The PBI model is to provide students with an authentic and meaningful impact situation on problems that can provide convenience for students to carry out an investigation (Drs. Jawane Malau, 2006). Learning with the Problem Based Instruction model can improve a skill in critical thinking in students and an increase in learning outcomes for students (Agustina & Astuti, 2016).

PBI learning model is used because in the way of implementing learning students are faced with problems in real activities as something that must be learned and as one of the things that must be taught and as a process so that they can train and can improve a skill in critical thinking and can solve a problem. problems and knowing understanding of important knowledge and concepts. The role of a teacher in PBI is to facilitate and investigate, and hold discussions then present problems, and direct problems (Hadi & Susanti, 2017). With the existence of a learning model that can help in increasing the learning outcomes of students, one of which is by using a varied learning model, so students can improve an outcome from their learning, by holding a variation on the learning model is this that is very necessary. carried out on teachers, so that the lessons taught to teachers can be more interesting and can make students excited to be able to follow a lesson that will be brought by the teacher (Harahap & Nazlia, 2019). In the model, learning is an effort to be able to get results in success and success in achieving a lesson goal. With the model in the lesson it is also designed with materials and procedures in the lesson to be able to achieve a goal in the lesson (Harahap et al, 2021).

Based on the results of observations made by reviewers regarding the effect of using the model in problem based instruction (PBI) lessons on learning outcomes for students in the respiratory system material for class XI at the Dar al-Ma'arif boarding school. There are problems found in class XI at the Dar al-Ma'arif boarding school from the results of observations and direct interviews with teachers in biology subjects, it was seen that students still had expertise in low critical thinking which was indicated by the lack of an activity to answer, ask, and express opinions as well as responding, reasoning. , are not used to being able to solve a problem well, and try to draw conclusions that are still very lacking in a teaching activity in the room and the teacher is also still using a strategy in teaching manually which is dominated by lectures so that a The process in the lesson takes place in one direction, where students only take notes and listen, and occasionally only ask and answer questions to the teacher. In this case, it also has an impact on an achievement in the results of student biology learning achievement. In this case the reviewer also took the initiative to be able to draw a conclusion that the problem-based learning model (PBI) is very suitable for use with the implementation of a PBI lesson model. improve students' learning outcomes for the better in the future. The purpose of this study is to find out the effect of using the problem based instruction (PBI) learning model on learning outcomes in the respiratory system material in room XI at the Dar al-Ma'arif Islamic boarding school.

▪ METHOD

This research was conducted at the Dar al-Ma'arif Islamic Boarding School. This type of study uses a quantitative approach. This research was carried out on the examiner directly in the teacher both in the control room and also in the experimental room. This research is also classified as a quasi-experimental study with an experimental room design and a control room that is given a pre-test and post-test. The design in the research used in this study is the Non-equivalent Control Group Design. The lesson used as treatment in this case is distinguished by the Problem based Learning model for the experimental group and ordinary learning without treatment for the control group.

The research procedure used is the preparation stage, compiling research instruments in the form of learning outcomes tests on cognitive types to measure student learning outcomes on the material to identify the properties of spatial structures. validating the research instrument, namely the test of learning outcomes for the respiratory system material, the stages of carrying out experiments, which are carried out to determine the research sample in the form of a class from the population taken and then randomized to determine the experimental class and control class, giving treatment to the experimental class in the form of a Problem Based Learning model and a control class in the form of ordinary learning, then giving a post-test at the end of the study, both for the experimental group and the control group. The data collection of learning outcomes in this study used the test method.

The population in this study is the students of room XI Islamic boarding school dar al-ma'arif. The samples used in this study were students in room XI A (experimental room) and room XI B (control room). The sample used in this study was taken as many as 2 classes totaling 40 students in room XI A and room XI B. The type of research was quasi-experimental. with a post test only control group design, the sampling in this study was carried out using a random sampling technique. The independent variable in this study is the Problem Based Instruction (PBI) learning model and the dependent variable is the result of students' learning of techniques in data collection. the test technique used to collect data on the mastery of the material.

The data needed is data about the learning outcomes of students on the material Respiratory system in room XI at the Dar al-Ma'arif Islamic Boarding School. To collect the data, a learning achievement test was used. The respiratory system learning achievement test was prepared by the reviewer. After the test is prepared, the validity, discriminating power, level of difficulty, and reliability are first tested. Based on the results of the validity and discriminatory test, there are 25 questions. t. Before carrying out a data analysis, prerequisite tests are carried out in the analysis such as the normality test for the data distribution and the homogeneity of variance test To be able to test the homogeneity of variance tested using the F test. If F count F table then the two populations have different variances (not homogeneous), If F count < F table then the two populations have homogeneous variances.

▪ RESULT AND DISSCUSSION

Based on the results obtained by the reviewer regarding the influence in the use of a problem based instruction (PBI) learning model on student learning outcomes in the respiratory system material in room XI at the Dar al-Ma'arif Islamic boarding school, the experiment on students in the experimental room and in the control class, there are 20 students each, which can be seen in the diagram table where the learning model that has

been carried out helps improve student learning outcomes, one of which is by using a varied model, students will be able to improve their learning outcomes below: Experimental class diagrams of students in the control class and experiment class using the Problem Based Instruction (PBI) learning model:

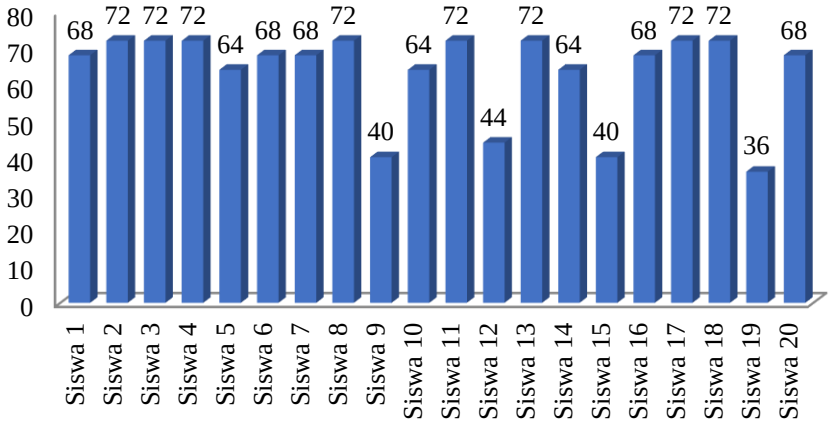

Figure 1. Score of students at the control group

It can also be seen in the table diagram the value of student data in the control class that acquisition of has data value The results of student learning in the control class results which amounted to 20 students that the results of the largest data value obtained a value of 72 and from the acquisition of student learning outcomes in the Use of a Problem Based Instruction (PBI) Learning Model in the control room the highest score was obtained at 72 with the number of students as many as 20 students while the lowest score of the control class was 36 with the results with an average score of 56.2.

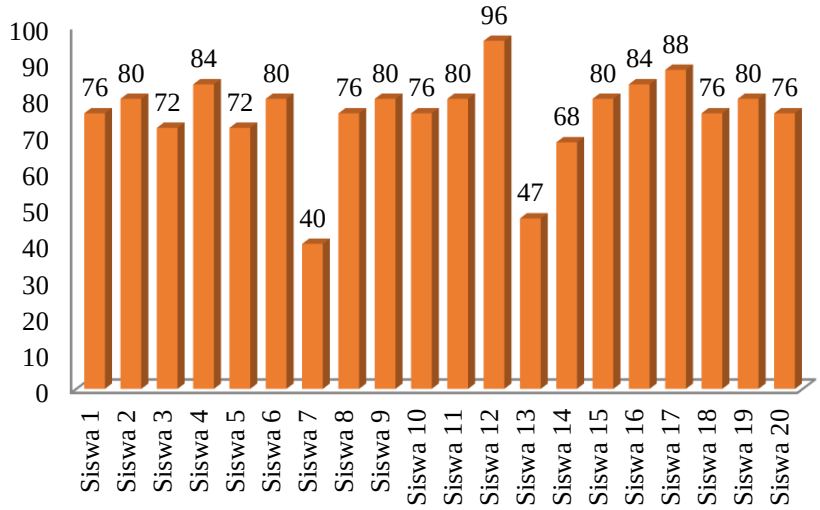

Figure 2. Score of students at experimental group

It can be seen in the table diagram of the value of student data in the experimental class that the acquisition of student learning outcomes data on the results of the Experimental

class which amounted to 20 students in the results of the experimental class had a total of 20 students, the highest score was obtained at 96 while the lowest value from the class experiment 40 with an average score of 66.4. The experimental room has a higher value due to the use of the Problem Based Instruction (PBI) learning method which is easier to understand and easy to understand in understanding a concept that is difficult if students discuss with each other with each other. friends, students also work together in teams to be able to help each other solve and solve complex problems, in this case that the use of this learning model has a major influence on the results of learning in students. In this case, it also makes the acquisition of learning scores by students due to the use of a learning model, namely Problem Based Instruction (PBI) which can be done by students more responsible for learning outcomes because students have motivation with responsibility in solving problems faced by students. This finding is inline with the results of (Lepiyanto, 2020). At the beginning of the implementation of the lesson, students have been given motivation, then students do the solution in the problem. problems posed to teachers who are faced in real situations (contextual) or problems that exist in students' daily activities then students are also easy to carry out in investigations in order to be able to solve a problem faced by students.

Table 1. Mean score of students' learning outcomes with Problem Based Instruction

No	Groups	Lowest Score	Highest Score	Average
1	Control	36	72	56.2
2	Eksperimen	40	96	66.4

Researchers also conducted an assessment using the test method. which tests have been given such as pre-test and post-test as many as 25 questions "The pretest that has been given before has not carried out a space management (practice on the digestive system in humans that has been carried out before using the learning model with Problem Based Instruction) while in the Posttest experimental room which has been given when a room management has been implemented (practice about the human digestive system after carrying out a Problem Based Instruction lesson model). The same thing was also carried out in the control room without giving any experiment. The instrument used in the activity of this test is a choice of 25 questions, this gives an increase that the results of the percentage of students who have answered very correctly and correctly on the post-test have given an indication that the use of the PBI model can have a positive effect on an achievement result in student learning (Titin, Yanti, & Panjaitan, 2011). In addition to the test, information can also be obtained through observation in the process of implementing the lesson, on the acquisition of scores on the answers to the posttest and pritest questions, and so on. Data such as documents can be used in order to explore information that occurred in the past. As well as the reviewer must also be able to carry out a data analysis by testing analyzes such as normality and homogeneity tests, then proceed with testing the T test on the acquisition of the results of this study. shows that there is an effect on the Problem Based Instruction learning model on the learning outcomes of the respiratory system at the Dar-Ma'arif Islamic boarding school in room XI.

The results of learning acquisition by students can be known in the implementation of an initial test (pre-test) and posttest. Problem Based Instruction model is significantly more successful than a learning model that is used simply on the respiratory system

material in humans. The average obtained is 66.4 and in the post-test with a value of 96. Then in the control room the average value of the pre-test results stage is 56.2 and in the post-test is 72. In the results obtained the average value can be It is known that using a Problem Based Instruction learning model can increase the results in learning biology with the results of the t-test of 1.99 and t-table of 1.9. Thus, tcount ttable or 1.99> 1.9, then Ha is accepted and Ho is rejected.

Table 2. the results of the t-test

Data	Class	N	t_{count}	Description
Pretest	XIA	40	1.99	Ho Ditolak
Postest	XIB	40	1.9	H1 Diterima

Final score is the result of the learning outcomes students can seen in the percentage on the level of mastery of students in the value of the way (affective aspects, as well as psychomotor, cognitive,) then the results of the percentage on the mastery of students in the acquisition of the results of the final test (formative test). In the level of mastery in each student is different, this can be seen in the acquisition of various final grades. biology teachers, so that before giving a lesson to students, they should be more selective in choosing a model or a media to be used that can make students more active and involved enthusiastically in carrying out learning activities then the results achieved can meet a criterion in minimum completeness score that has been applied to the institution (Kailola et al., 2017).

In the module as teaching material that can support a learning activity that has never been carried out and implemented and applied, therefore it needs to be developed in a learning model that is expected to improve a learning activity for students, knowledge of a concept and finally can increase the acquisition of learning outcomes for students (Winarsih, 2014). students also play an enthusiastic and active role in finding and finding things for themselves that are needed in the implementation of the learning process then students no longer consider biology learning as a very unpleasant learning and but a very easy lesson to learn (Medianty et al., 2018).

The results of the acquisition of learning scores on students in using a Problem Based Instruction learning model are higher in using a conventional model. in choosing a learning model and strategy in learning in adjusting to a material that will be delivered in achieving a goal to be achieved and can be realized. This PBI model is a learning model that has been given to students in meaningful and authentic problem situations (Hadi & Susanti, 2017) . It can be seen that the results of the pretest scores in the control class can be seen that the scores using a lesson model are higher than those who do not use a lesson model, before students fill out the pretest, the problem based instruction (PBI) learning model is applied which has a value of 56.2 while students who did not do the model in problem based instruction (PBI) lessons and immediately filled out the pretest had a score of 43.8.

Problem Based Instruction (PBI) learning model can affect the learning outcomes of students in different materials, therefore because the use of a Problem Based Instruction (PBI) learning model can help students in learning, such as in inviting students to be able to think for themselves and to increase a student's curiosity, as well as find something new, and build a self-confidence of students and to be able to appear in front

of the room, can provide a motivation for students to be more active in ask questions so that in the use of a Problem Based Instruction (PBI) learning model (Sihombing, 2018). During the implementation of the learning method in an ongoing manner, not all students can be effectively and actively involved. With most of the students can only record the explanations that have been given, see and pay attention, even the questions given by students are quite minimal. This can be caused because in the way of learning by using a lecture model, in learning it can only interact with through oral speech from a teacher learner (Eka, 2016).

Table 3. Pretest and posttest results in control and experimental groups

Data	Group	Without PBI	With PBI
Pretest	Control	43.8	56.2
Postest	Experiment	33.6	66.4

It can be seen in the diagram above that the results of the posttest scores in the class In control, it can be seen that the value of using the learning model is higher than not using the lesson model, before students fill out the pretest, it is applied using the problem based instruction (PBI) learning model which has a value of 66.4 while students who are not applied the problem based learning model. instruction (PBI) and directly filling out the pretest has a value of 33.8 that in the use of the learning model students are more likely to increase their learning outcomes compared to those who do not use the learning model.

Implementation of a model in the lesson with a problem based instruction model through a discussion. With discussion the teacher can provide an opportunity for students to be able to collect an opinion, and make a report or follow various alternatives in solving a problem. In order to increase the value of learning outcomes, it is necessary that the opinions of students are based on an insight that is in itself with the belief that there can be more than one answer or the possibility of having many correct answers. In this case, discussion is also a way that many have given a possibility in the best solution (Sa'adah, 2016). Data on the acquisition of assessment results that have been produced by the reviewer are the results of data acquisition of students ' learning scores measured using a test given to the human respiratory system material. The test questions given to students have been tested for feasibility so that questions are able to measure problem solving abilities in a learning for students. (Berutu & Muhammad, 2021).

Based on the acquisition of the average score (mean) it shows the results of the acquisition in learning to students before giving a treatment of 76 while the results of obtaining the average value of learning outcomes of students after being given a treatment is 97.5. In addition, from the results of the t-test, it can be seen that the t-count value produced is smaller than the t-table value, which is 1.724. Therefore, t count > t table, H0 is rejected and Ha is accepted, which means that the use of the Problem Based Introduction (PBI) model can influence and improve the results of student learning scores (Firdayanti, 2018). In doing good and fun lessons and generating an activity in learning and the results of the acquisition of learning outcomes for students. then in increasing an activity in learning in students and the acquisition of learning outcomes for students, it is necessary to carry out a learning model that can be fun. One of them is a learning model that is in accordance with the student's circumstances, so the learning model that can be

done is Problem Based Instruction (Muah, 2016). The results of the acquisition of learning scores of students in the experimental room I using the learning model is very good than the results of the acquisition of student learning in the control room, it can be seen that the results of the average students in the experimental room are better than the control room. in this case it can be concluded that by using the Problem Based Learning (PBL) learning model can affect the learning outcomes of students on the respiratory system material.

▪ CONCLUSION

Lessons Using the PBI model has a good impact on learning outcomes for students. This is because in solving a problem faced by students will be accustomed to finding a concept which will then make it easier for students to carry out learning. Based on the results obtained and discussion of the assessment in the previous explanation, it can be concluded that: (PBI) on the acquisition of the results of the learning of students on the material regarding the respiratory system in room XI at the Dar al-Ma'arif Islamic boarding school with the use of the Problem Based Instruction (PBI) Lesson Model in the control room, the highest score was obtained at 72 while the lowest value was in the control room. control 36 with an average score of 56.2 and while the experimental room the highest value was obtained at 96 while the lowest value was obtained from the experimental room 40 with an average score of 66.4. The experimental room had a higher value due to the the use of learning methods with Problem Based Instruction (PBI) is easier to understand and easy to understand by understanding the concept.

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