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The Influence of Problem Based Learning and Media to Increase Student Interest and Learning Outcomes

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Abstract: *The aim of this research is to find out whether there is an influence of the use of problem and video based learning models on student interest and learning outcomes. This research was conducted at SMA Negeri 14 Medan and the research population was all class. In the research, the pretest score was 34.85 and the posttest score was 80.28. Normality and homogeneity tests were carried out and the results showed normal distribution. In hypothesis testing using One Sample T-Test, a Sig.(2-Tailed) value of 0.002 was obtained. Therefore, a value of 0.002< α (0.05) means that the hypothesis is accepted, which shows that there is an influence of the use of problem-based learning models and videos on student learning outcomes in chemical bonding material. Meanwhile, for the results of student interest in learning, the average score obtained was 76.06 in the high category. This shows that there is an influence of the use of problem-based learning models and videos on students' learning interest in chemical bonding material.*

Keywords: *Learning Outcomes; Video Media; Interest to Learn; Problem Based Learning*

INTRODUCTION

Education is a means or bridge for humans to be able to develop their potential through the learning process they gain. As we know, it is stated in the 1945 Constitution Article 31 Paragraph 1 which states that: "every citizen has the right to education". So, it is clear that education is every individual's right to obtain it (Fitri, 2021). "In Indonesia, the implementation of the curriculum has undergone various changes and improvements, namely in 1947, 1964, 1968, 1973, 1975, 1984, 1994, 1997 (1994 curriculum revision), 2004 (Competency Based Curriculum), and 2006 curriculum (Education Unit Level Curriculum), and in 2013 the government through the Ministry of National Education changed it back to the 2013 curriculum and in 2018 there was a revision to become the 2013 Revised Curriculum" (Ulinniam et al., 2021). At this time a new curriculum emerged, namely the independent curriculum. Where the independent curriculum is interpreted as a learning design that provides students with the opportunity to study calmly, relaxed, fun, stress-free and pressure-free, to show their natural talents.

Merdeka Belajar focuses on freedom and creative thinking. One of the programs outlined by the Ministry of Education and

Culture in launching independent learning was the start of a driving school program. This school program is designed to support each school in creating a generation of lifelong learners who have the personality of Pancasila students. For the success of all this, the role of a teacher is needed. With the independent curriculum, it is hoped that students can develop according to their potential and abilities because with the independent curriculum they receive critical, quality, expressive, applicable, varied and progressive learning. "And this new curriculum change requires cooperation, strong commitment, seriousness and real implementation from all parties, so that the Pancasila student profile can be embedded in students" (Abroto et al., 2020).

Science education has an important role in improving the quality of education. In this case, we know that chemistry is part of science lessons which is essentially knowledge based on facts, the results of thoughts and research products of experts, then the development of chemistry is directed at scientific methods, scientific attitudes and scientific products owned by students and ultimately leading to improved student learning outcomes. Chemistry can be found in everyday life, but quite a few students consider chemistry to be an uninteresting science (Purba & Fitri, 2021). Students are known to have several problems in the chemistry learning process, such as understanding the material on chemical bonds, determining ionic compounds and covalent compounds, and describing Lewis structures. This is because students tend to be passive and pay less attention to the teacher, and students also easily feel bored during the learning process. To foster student activity and creativity in the learning process, teachers are expected to apply learning models that attract students' interest in learning.

A learning model is a plan or pattern that can be used to form a curriculum (long-term learning plan), design learning materials and guide learning in the classroom or otherwise. The chemistry learning models that are recommended to be applied are the PBL, PjBL, and IBL models which are based on constructivist learning theory, namely a process of assimilating and linking experiences or lessons learned with existing understanding and a process of completing new concepts and ideas with a different framework of thinking. already exists so that new construction can be obtained (Sutiani et al., 2022). A learning model is a plan that describes systematic procedures for organizing learning experiences to achieve learning goals. The function of the learning model is as a reference for teaching designers and educators in implementing learning.

The choice of learning model is greatly influenced by the nature and type of material to be taught, the goals to be achieved in learning, and the level of ability or competency of students. There are two student-centered learning models, namely cooperative learning and problem based learning (Djalal, 2017). Based Learning's problem learning model is learning that focuses on students as self-learners towards authentic or relevant problems that will be solved by using all the knowledge they have or from other sources. The implementation of problem base learning (PBL) models using concrete media can be an effort to improve mathematics learning outcomes. This is because the Problem Baseline Learning (PBL) model raises problems as an initial step in collecting and integrating new knowledge (Hermuttaqien et al., 2023).

Learning media is useful for facilitating students' understanding in the learning process. Learning Media as a tool in realizing the success of the teaching and learning process seems to have a big contribution to the teacher's victory in teaching. Apart from creating a happy atmosphere that is received by students, learning media also makes it easy for teachers to convey material and easy for students to receive it as a return for the process. The best use of learning media is to identify the form of teaching and learning activities that will be carried out so that appropriate learning media

can be selected in implementing the teaching and learning process. Apart from that, what is needed in selecting good learning media is to pay attention to the characteristics of the learning material that will be delivered (Silaban & Panggabean, 2022).

According to (Novita et al., 2019) in their research, video media is a type of learning media, video media really helps educators in conveying material that is difficult to convey and difficult for students to understand. students in the learning process as well as students knowing the process of earthquakes and so on. According to (Widarti et al., 2018), chemical bonding material explains how atoms form bonds, both with the same atom and with different atoms. Chemical bonds occur because a group of atoms shows a more stable unity because it has a lower energy level than the energy level of the constituent atoms in a separate state. The concepts in chemical bonding are abstract. A good understanding of concepts will make it easier for students to study chemical bonding material which has many concepts. Understanding the concept of chemical bonding is the basis for understanding subsequent concepts in chemistry, including chemical equilibrium, thermodynamics, molecular structure, and chemical reactions.

It is hoped that this learning video can help teachers improve the quality of learning both face-to-face and online so that teachers do not have to explain the material in full to students. Another benefit of having these learning videos is that they create a more active learning atmosphere where the learning is centered on the students while the teacher is only a tutor who only helps facilitate the students to be more active. This indirectly invites students to understand concepts in a real way continuously and train their abilities in order to move towards a better direction and make students more independent in the learning process (Parera et al., 2022). Based on the results of researchers' observations of one of the chemistry teachers at SMAN 14 Medan, chemistry learning was carried out conventionally. Where learning is teacher-centered while students are only passive and act as listeners, but are expected to be able to understand the material spoken by the teacher. This results in students getting bored easily, lacking initiative, and depending on the teacher. Chemical bonding material is usually grouped into four sub-themes, namely ionic bonds, covalent bonds, metallic bonds, and intermolecular forces. The chemistry learning process at SMAN 14 Medan has used learning media to make it easier for students to understand quite complex chemical concepts. However, there is a problem, namely the lack of availability of learning media including Chemical Bonding material which must be clearly reflected in students' understanding so that there is no difference in understanding between teachers. Due to the problem of the lack of suitability of the model used and the lack of availability of learning media, this causes students to experience difficulties in understanding the material presented and quickly feel bored when the learning process takes place. So that students' understanding of the material presented by educators is not in line with the goals they want to achieve, as a result many students' learning outcomes are still below the KKM (Minimum Completeness Criteria), where the KKM that must be achieved is 75.

From the description presented above, it can be concluded that students must be provided with learning using appropriate models and learning aids (media) whose availability is sufficient. This is done so that in the learning process students can be active, creative and effective in achieving the learning objectives and students can understand the concepts of Chemical Bonding material. To solve this problem, one way that can be done is to implement appropriate learning models and media in the learning process. So, based on this problem, research was carried out with the aim of finding out the effect of using a problem-based learning model with the help of video media on learning outcomes and students' interest in learning about chemical bonding material.

LITERATURE REVIEW

Problem Based Learning

The Problem Based Learning model is a learning model whose learning process is based on problems that require students to work together in groups to gain knowledge through solving the problems presented (Dalimunthe & Ginting, 2022). Problem-based learning (PBL) is a method that challenges students to work actively in groups, think critically and analyze, and to discover knowledge using appropriate learning resources (Ramadhana & Sutiani, 2023). So in this learning model, problems related to the material to be presented are the most important basis for gaining the expected knowledge according to the learning objectives.

In the scientific method, students learn to find problems through observation, identification, interpretation and understanding the problems given by the teacher, then solving these problems through literature study or conducting experiments. The expected result is that chemistry learning will be fun, motivating and challenging so that students are expected to be able to participate actively, have sufficient learning experience, and have optimal learning results (Darmawati, 2019).

According to (Agustina et al, 2017), the syntax in the Problem Based Learning model is as follows: (1) Student Orientation to Problems. At this stage the teacher explains the learning objectives and prsovides phenomena, demonstrations or stories to raise problems and invite students to be involved in problem solving; (2) Organizing Students to Study. At this stage the teacher explains the learning tasks related to the problem; (3) Guiding Individual and Group Investigations. At this stage students are expected to search for information, carry out experiments to find solutions to problems which will be guided by the teacher; (4) Develop and Present Problem Solutions. At this stage students solve problems and present the results obtained from solving the problems obtained; (5) Analyze and Evaluate the Problem Solving Process. At this stage the teacher analyzes and evaluates the results of the problem solving process that the students have worked on.

The Problem Based Learning model has advantages and disadvantages in the learning process. According to (Vebrianto et al., 2021), the advantages of the Problem Based Learning model are as follows: (1) Students will be used to facing problems and will be challenged to solve them; (2) Foster student solidarity through group discussions in solving problems; (3) Strengthen the relationship between teachers and students; (4) Familiarize students with conducting experiments; (5) Increase student activity in learning; (6) Develop students' knowledge and sense of responsibility for solving given problems.

Meanwhile, the weaknesses of the Problem Based Learning model are as follows: (1) Students who do not understand the problem given will be less motivated in solving the problem; (2) Requires a lot of time to learn; (3) Students who experience failure in their experiments and feel less confident will be reluctant to try again.

Video Learning Media

Animated video media is media in the Video or film is a concrete medium that has been proven to be effective in conveying information, forming opinions and arousing public empathy. Rapid developments in the fields of computer technology, smartphones and video editing software have made it possible for everyone to produce learning videos independently and with tools that are practical to use. Etymologically video comes from the words vidi and visum which mean to see or have the power of sight. Video is a technology for capturing, recording, processing, storing, transferring and reconstructing sequences of still images by presenting scenes in motion electronically so that video displays appear like moving images (Parera et al., 2022)

According to several other research results show that learning videos have a number of advantages that are beneficial for

students. The results of the author's research show that the use of videos in the learning process can increase students' learning motivation, help students understand the lesson material, increase student independence and involvement in the learning process, and increase students' understanding of the lesson material. The use of learning videos also has a positive impact on teachers, namely: (a) training educators' creativity, (b) helping teachers visualize lesson material for students (c) enriching teachers' teaching materials, (d) increasing teachers' personal branding as video (content), (e) increase teacher copyright, and (f) increase teacher income from the results of making videos. The enormous benefits of videos for the learning process have encouraged educators and administrators of educational institutions to buy, download or produce learning videos. Therefore, procuring learning videos can be done in two ways, namely: (1) evaluating available learning videos, and (2) producing learning videos according to learning needs (Mashuri & Budiyono, 2020).

Learning Outcomes

Student learning outcomes are achievements achieved by students academically through exams and assignments, active asking and answering questions that support the acquisition of these learning outcomes (Dakhi, 2020). Learning outcomes are the achievement of educational goals for students who take part in the teaching and learning process. Where later it will reflect changes in behavior including cognitive, affective and psychomotor learning outcomes. According to (Ramadhana & Sutiani, 2023) learning outcomes are a parameter that can be used to determine the success or failure of an educational objective that has been implemented in an educational unit.

Learning outcomes are a description of a student's progress or development during their studies, from when they first started participating in an educational program to when they ended their educational program. In the learning process, there are several things that influence student learning outcomes. According to (Panggabean et al., 2023) factors that influence learning outcomes consist of internal and external factors, as follows: (1) Internal factors are factors that arise from within the individual himself, including physical and psychological factors; (2) External factors, namely factors that arise from outside the individual himself, including family, school and community factors.

Learning outcomes will appear in several aspects, including:knowledge, understanding, habits, skills, appreciation, emotional, social, physical, ethical or character relations, and attitudes. A person who has carried out learning actions will see changes in one or several aspects of behavior as a result of the learning results (Siregar & Simatupang, 2020).

Interest in Learning

Interest is a psychological aspect that can encourage someone to achieve certain goals. Interest is not owned by someone without going through a process, but is something that can be achieved and developed. Interest in learning can be seen through curiosity about the learning material, preparations made before learning, as well as enthusiasm and involvement during the learning process. This interest in learning can be aroused through fun learning activities (Dina & Nugraheni, 2017).

Interest in learning also has indicators in it, namely a feeling of interest and enjoyment in learning, active participation, a tendency to pay attention and great concentration, positive feelings and an ever-increasing willingness to learn, comfort when studying, and having the capacity to make decisions related to the learning process they are undergoing (Yunitasari & Hanifah, 2020). Some of the psychological factors that have been mentioned are wrong the other is interest. People who do not have interest in certain subjects find it difficult to achieve learning success the optimal one. Interest is a psychological statement that shows concentration of attention on a subject matter because the object is interesting to him.

Interest in learning is a high tendency towards a passionate desire for a change that occurs in a person in carrying out activities (learning) which really depends on the capacity they have (Zega & Darmana, 2019).

METHODS

Research The type of research carried out is quasi-experimental design. A quasi-experiment is research that approaches a real experiment (Sugiyono, 2015). This research aims to directly test the influence of one variable on other variables. This research was carried out from September 2023 to February 2024. The population in this research is all class The sample used in this research was 1 class taken randomly. The sampling technique used is random sampling. The random sampling technique is a technique for randomly determining samples (Mamik, 2015). In this study, 36 samples were taken with homogeneous status. Student homogeneity can be seen from the similarity of pretest results, student learning processes and supporting facilities in the learning process. The pretest and posttest data obtained will be tested with SPSS 22.0 for Windows software.

The approach to this research was carried out quantitatively. Quantitative research provides the power to translate real-world complexities into crunchable numbers, opening vast doors for knowledge development and problem solving. Using this approach, researchers can explore relationships between variables, identify patterns, and make strong generalizations to support their findings (Rachman et al., 2024). The research design used is one group pretest-posttest (one group pretest-posttest design). This design was chosen because it only uses one sample (class) and there is no comparison sample (class). In this research, the technique used was a test technique in the form of a pretest and posttest with 20 questions, and a non-test technique in the form of a questionnaire with 25 statements. The research design can be seen in table 1 below.

Table 1. The research design

Class	Initial Conditions	Treat	Final State
Eksperiment 1	T_1	X	T_2

With
T_1: Pretest
T_2: Posttest
X: Learning with a problem-based learning model

RESULT AND DISCUSSION

The data from this research were obtained from the results of the pretest and posttest. By using the problem-based learning model, student learning outcomes increased and students' interest in learning increased significantly with an average pretest of 34.86 and for the posttest an average score of 80.28 was obtained. As well as high student interest, the average student score data obtained was 76.06 in the high category. For more details, the pretest and posttest scores can be seen in Figure 1 below:

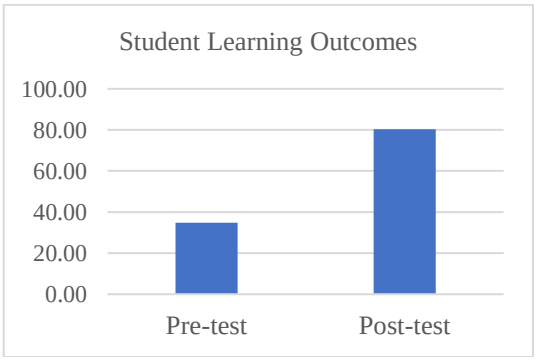

Figure 1. The graph of student learning outcomes

Normality Test

The requirement that research data can be used for parametric testing is that a normality and homogeneity test of the data is first carried out. The normality test was carried out using the Shapiro-Wilk test with SPSS 22.0 for Windows at a significance level of $\alpha = 0.05$. The results of testing the normality of pretest and posttest data in the experimental class can be seen in table 2 below.

Table 2. The normality test results

Learning Outcomes	Shapiro-Wilk Statistic	df	Sig.	Explanation
Pretest	0.915	36	0.059	Normal Data
Postest	0.943	36	0.065	Normal Data

Based on the results of the research data normality test calculations above, it can be concluded that the research data is declared to be normally distributed with a sig. pretest is 0.059 and the sig value. posttest, namely 0.065, which means it is greater than the significance level α = 0.05.

Homogeneity Test

The homogeneity test was carried out using the Levene test with the help of SPSS 22.0 for Windows with the specified significance value α=0.05. The homogeneity test is carried out to find out whether the sample comes from homogeneous data. Data from the homogeneity test results can be seen in table 3 below.

Table 3. The homogeneity test results

Learning Outcomes			
Levene Statistic	df1	df2	Sig.
12.596	1	70	0.169

Based on the results of the homogeneity test calculation of the research data above, it can be concluded that the research data is normally distributed with a sig. 0.169 which is greater than the significance level α = 0.05.

Hypothesis Test

To find out the differences between the two experimental classes, a statistical test was carried out using the SPSS for Windows software program, namely the Independent Sample T-Test. The results of testing the hypothesis test data in the experimental class can be seen in table 4 below.

Table 4. The hypothesis test

Class	Eksperiment
t_{count}	3.26
t_{table}	1.69
df	35
Sig. (2-tailed)	0.002
Mean Difference	5.278
Explain	$Ha_{accepted}$

From the results obtained, namely $t_{count} > t_{table}$ (3.26 > 1.69) and the sig.(2-tailed) price where 0.002 < α (0.05), then H_0 is rejected and H_a is accepted. This means that there is an influence of the use of a problem-based learning model with the help of video media on learning outcomes in the Chemical Bond material.

Based on the results of previous research by (Syaribuddin et al., 2016) it shows that problem-based learning with the help of video media can improve student learning outcomes with the gain test results that have been studied, namely 3.058 to 6.754, so there is a significant influence on the application of the media-assisted problem-based learning model. video at SMA Negeri 1 Panga on chemical bonding material for class X MIA, with the average score of the experimental class being higher than the control class. In other research discussing chemical bonding material in the ionic and covalent bonding sub-material, there was an increase in learning outcomes using a problem-based learning model with a pretest score of 52, and after being taught using problem-based teaching materials the result was 81.5, so the learning model was used. Problem-based is very effective in learning chemistry (Tuty & Purba, 2021)

The results of this research show that the problem-based learning model is more useful for finding and solving problems, and can help students organize the concept of ionic and covalent bonding sub-materials through the video media being studied, so that it can improve student learning outcomes. This shows that there is an influence of the use of a problem-based learning model with the help of video media on student learning outcomes in chemical bonding material.

As for students' interest in learning using the problem-based learning model with the help of video media on chemical bond material, only 19 students were in the medium interest category and 17 students were in the high interest category. The calculation result of the average student interest in learning is 76.06, so that based on the scoring criteria interest is in the high category. Based on the results of previous research by (Rahayu & Prayitno, 2020), students' interest in learning has a positive influence on students' understanding of concepts. Thus, it can be said that the combination of problem-based

learning models and videos is effective in increasing students' interest and understanding of concepts. This is also in line with research by (Syaribuddin et al., 2016) where interest in learning has a positive and significant effect on learning outcomes.

Thus, an increase in interest in learning will be followed by an increase in learning outcomes. This means that the better the student's interest in learning, the better the impact on student learning outcomes. This shows that there is an influence of the use of a problem-based learning model with the help of video media on students' learning interest in chemical bonding material.

CONCLUSION

Based on the results of data analysis and discussion, it can be concluded that: there is an influence of the use of problem-based and video learning models on student learning outcomes in class X-3 chemical bond material. The learning activity of students who were taught using the problem-based learning model (Posttest) was 80.28, higher than the learning activity of students before being taught with the problem-based learning model (Pretest), namely 34.86, and based on the one sample t-test, a value of sig.(2-tailed) namely $0.002 < \alpha$ (0.05), then Ha is accepted; there is an influence of the use of problem-based learning models and videos on students' interest in studying chemical bonding material. The average value of student interest in learning is 76.06 with high criteria. In the teaching and learning process, especially in chemistry subjects on Chemical Bonds, teachers should apply problem and video-based learning models. The results of this research are very useful for teachers, especially teachers in the field of chemistry, which can be used as material to improve student learning outcomes.

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