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The Effect of Problem-Based Learning with Animation Assisted Video on Improving Students' Learning Outcomes in Acid-Base Solution Material

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Abstract: The Effect Of Problem Based Learning With The Assistance Of Video Animation On Increasing Students' Learning Outcomes In Acid Base Solution Materials. This study aims to determine significant differences in the learning outcomes of students who are taught using the Problem Based Learning learning model with video-assisted direct learning models on acid solution material base. The subjects of this study were students of class XI IPA 1 and students of class XI IPA 2 at SMA Negeri 7 Medan. The object of this research is Video Animation Media which will be validated by 1 media expert validator. The steps in this study were 1) Research and initial data collection, 2) Observation at SMA Negeri 7 Medan, 3) Research Planning, 4) Test the Validity of the Test on Class XII IPA 5 students at SMA Negeri 7 Medan, 5) Test Initial ability of students in class XI IPA 1 and students in class XI IPA 2 at SMA Negeri 7 Medan, 6) Starting research according to the Learning Plan based on the Problem Based Learning Learning Model assisted by animated video media in the experimental class and research according to the Learning Plan based on the Media-assisted Direct Learning Model Animated video for the control class at SMA Negeri 7 Medan. The research method used is a quantitative method in the form of Quasy Experiment Design. The results showed $t_{count} > t_{table}$ (4.530242 > 1.670649) meaning that there was a significant difference in the average learning outcomes of students between the experimental and control groups after the treatment. The conclusion in this study is that there is a difference in the increase in student learning outcomes when using the Problem Based Learning model assisted by animated video media which is better than the direct learning model assisted by animated video media.

Keywords: Problem Based Learning Model, Video Animation, Learning Outcomes

Abstrak: Pengaruh Model Pembelajaran Problem Based Learning Berbantuan Media Video Animasi Terhadap Peningkatan Hasil Belajar Peserta Didik Pada Materi Larutan Asam Basa. *Penelitian ini bertujuan untuk mengetahui perbedaan yang signifikan hasil belajar peserta didik yang dibelajarkan menggunakan model pembelajaran Problem Based Learning dengan model pembelajaran langsung berbantuan video animasi pada materi larutan asam basa. Subjek penelitian ini adalah peserta didik kelas XI IPA 1 dan peserta didik kelas XI IPA 2 SMA Negeri 7 Medan. Objek pada penelitian ini adalah Media Video Animasi yang akan di validasi oleh 1 Validator ahli media. Langkah-langkah dalam penelitian ini adalah 1) Penelitian dan pengumpulan data awal, 2) Observasi di sekolah SMA Negeri 7 Medan, 3) Perencaan Penelitian, 4) Uji Validitas Tes terhadap peserta didik kelas XII IPA 5 di SMA Negeri 7 Medan, 5) Uji Kemampuan awal peserta didik kelas XI IPA 1 dan peserta didik kelas XI IPA 2 di SMA Negeri 7 Medan, 6) Memulai penelitian sesuai Rencana Pembelajaran*

berdasarkan Model Pembelajaran Problem Based Learning berbantuan media video animasi pada kelas eksperimen dan penelitian sesuai Rencana Pembelajaran berdasarkan Model Pembelajaran Langsung berbantuan media video animasi pada kelas kontrol di SMA Negeri 7 Medan. Metode penelitian yang digunakan adalah metode kuantitatif dalam bentuk Quasy Experiment Design (Eksperimen semu). Hasil penelitian menunjukkan $t_{hitung} > t_{tabel}$ *(4,530242 > 1,670649) artinya terdapat perbedaan signifikan rata-rata hasil belajar peserta didik antara kelompok eksperimen dan kontrol sesudah terjadinya perlakuan. Simpulan dalam penelitian ini adalah terdapat perbedaan peningkatan hasil belajar peserta didik pada penggunaan model Problem Based Learning berbantuan media video animasi yang lebih baik dibandingkan dengan model pembelajaran langsung berbantuan media video animasi.*

Kata Kunci: *Model Pembelajaran Problem Based Learning, Video Animasi, Hasil Belajar*

▪ INTRODUCTION

Chemistry is the study of the structure of matter, the properties of matter, the transformation of one substance into another, and the energy that accompanies changes in matter. Chemistry as a product includes a body of knowledge consisting of facts, concepts, and principles that scientists must acquire and develop chemical knowledge. Chemistry as a process includes the skills and attitudes scientists have to acquire and develop chemical knowledge.

In chemistry learning there are students who find it difficult to solve problems, in associating chemical concepts with theories correctly. There are still students who have difficulty with the formula without understanding the concept. This causes student learning outcomes to be weak (Suswati, 2021).

The 2013 curriculum is a curriculum that prioritizes understanding, talent and character education, besides that students are also required to understand the material, actively discuss and present and have a high discipline attitude. With the 2013 curriculum in the digital era, it teaches educators to be more able to make learning centered on students and place educators as motivators and facilitators, where students are required to learn independently. Learning activities are always influenced by several factors ranging from basic competencies, teaching materials, as well as learning resources, students who learn and educators who will manage learning (Purba, 2021).

In the world of education, the weakness of the learning process is a problem that is always faced. Usually students are always required to develop thinking skills, but the reality is that in the learning process in class students are actually more directed to memorize information and information than to think about how this information can be understood and accepted by students. Students are forced to memorize and collect knowledge and information and are also directed to understand how to use and apply the information provided in real life. So it is expected that students are not only smart in theory, therefore, to improve students' ability to create or produce contextual works, both their abilities individually and as a group so that it is recommended to use a learning approach in activities based on problems in everyday life (Holy, 2018).

Students' ability to think critically is carried out when the learning process is carried out, with educators giving directions to students to solve problems that have been provided by educators. Based on research that has been conducted by (Anastasia, 2018) which states and provides a conclusion that the results of research on the *Problem Based Learning model* are more effective for use to improve student learning outcomes (Ariani, 2019).

Several previous studies that refer to this research, namely the research of

Mawengkang., et al stated that the use of animated videos can improve learning outcomes in the reaction rate meter. Based on data collection in this study, the learning outcomes obtained scores above the minimum criteria after carrying out the treatment. These results indicate that the average learning outcomes by applying animated video media are higher than the average learning outcomes using the lecture method (Mawengkang, 2020). Wahyuni., et al's research proved that the use of animated videos in learning has a significant effect on students' learning activities on the material of electrolyte solutions. During the research process carried out the learning activities of students in chemistry learning went very well, students were also actively involved in the learning process. Through learning using animated videos, students will be given the opportunity to learn to find answers with broader insights and knowledge, so that through animated video media students are more active and have a positive impact on students' grades (Wahyuni, 2018).

This study has differences with previous studies where researchers used different treatments for the two samples. The use of the *Problem Based Learning* learning model assisted by animated videos will only be carried out in the experimental class, then the direct learning model assisted by animated videos will be carried out in the control class. From the description above, the use of animated video media is expected to improve student learning outcomes. Therefore, a study was carried out with the title "The Influence of Video Animation-Assisted *Problem-Based Learning Models* on Increasing Learning Outcomes in Acid-Base Solution Material".

- **Methods and Procedurs**

This research was conducted at SMA Negri 7 Medan on February 6 2023. This research was conducted in the even semester of the 2022/2023 school year.

Population and Sample

- **Research Population**

The population in this study were students of class XI SMA Negeri 7 Medan 210 students divided into 6 classes, each class consisting of 35 students.

- **Research Sample**

Sample selection in this research uses *purposive sampling,* according to Sugiyono (Maharani., et al., 2018) This technique is a sampling technique based on certain considerations. Based on the sampling technique, 2 classes were obtained, namely class XI IPA 2 and XI IPA 1

a) Class XI IPA 2 as an experimental class. Learning in this class uses the Problem Based Learning model assisted by animated video media.

b) Class XI IPA 1 as the control class. Learning in this class uses conventional learning assisted by animated video media.

Research design

This research is using experimental method. Experimental research is defined as the most complete quantitative research approach, the form of this research is *Quasi Experimental Design* research where this design has a control group, but cannot fully function to control external variables that affect the implementation of the experiment. The part of this design that is used is *the Nonequivalent Control Group Design* . The

experimental and control groups were pretested. Then, the two groups received different treatment, where the experimental group used a problem-based learning model assisted by animated videos on Acid-Base Solution material, while the control class used a direct learning model assisted by animated videos on Acid-Base Solution material. Then, both classes will be post-tested to see comparisons in the experimental and control classes.

▪ RESULTS AND DISCUSSION

The results of the research include analysis of research instrument data, research data, analysis of research data, and hypothesis testing

➢ Research instrument data analysis

The research data analyzed in this study is the test instrument data analysis. The researcher first prepared an instrument in the form of a test of 50 multiple choice instrument questions with five answer *options* namely A, B, C, D and the last one was E. The fifty items represent each indicator in the Acid-Base material. Pre-research, researchers tested the instrument test questions on 34 class XII students at SMA Negeri 7 Medan. The treatment aims to determine the validity, difficulty level, discriminating power, and reliability of the test instrument.

➢ Test Validation

In calculating the validity of the test used *product moment correlation.* Where the purpose of using the correlation is to find out which items are valid. So, the validation value of each item is adjusted to the value table r - *Product moment* at a significance level of $\alpha = 5\%$ criteria for $r_{count} > r_{table}$ at $\alpha = 5\%$. Whereas for N = 34 at a significant level of $\alpha = 5\%$ obtained $r_{table} = 0.34$. The results of testing the validity of the test instrument on students showed that out of 50 questions, 30 questions were valid and there were 20 questions

➢ Reliabilitya

After testing the validity of the items, valid items will then be tested again with a reliability test. When carrying out this reliability test the researcher used the KR-21 method which aims to obtain information that is used reliably as data collection and is able to reveal actual information in the field. Based on the test results on the items obtained a reliability value of 0.882 with reliable criteria.

➢ Difficulty Level

At the difficulty level of the test instrument based on test results in class XII students at SMA Negeri 7 Medan, based on the 50 questions that the researchers tested, it can be seen that there are 47 questions with moderate criteria, 2 questions with easy criteria and 1 item with difficult criteria.

Table. 1 Item Difficulty Level Test Results

NO	Information	Question Item Number
1.	Easy	6, 23

NO	Information	Question Item Number
2.	Currently	1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 24, 25, 26, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50
3.	Hard	27

- **Discriminating Power**

The criteria and results of the analysis of discriminating power that have been carried out by the researcher, from the 50 items tested the results of discriminating power on the items can be seen from the table below:

Table 2 Test Results for Differentiating Items

NO	Information	Question Item Number
1.	Easy	1, 2, 3, 4, 6, 7, 8, 9, 10, 12, 13, 14, 15, 18, 19, 20, 22, 36, 39
2.	Currently	5, 16, 21, 23, 24, 30, 32, 34
3.	Hard	11, 17, 25, 26, 27, 28, 29, 31, 33, 35, 37, 38, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50

Research result

Data in the study included *pretest, posttest scores,* increased learning outcomes (*gain*) for class XII IPA students at SMA Negeri 7 Medan.

Data on Student Learning Outcomes

Pre- treatment, the two samples were first given an initial test which is usually called (*Pretest*) which is expected to be able to see the initial abilities of each student in both classes. The treatment in two different classes where in the control class used a direct learning model assisted by an animated video while the experimental class used a problem-based learning model assisted by an animated video. *Pre-* learning is given *a pre-test* on two classes to find out whether students' initial abilities are the same or not. The questions

given were 30 multiple choice questions which were reused as a student's final ability test or what is commonly called *a post test.*

Table 3. Student Chemistry Learning Outcomes

Class	*Pre Test*	*Posttest*
Experiment	32.5 ± *33.22903*	85.3 ± *85.70322581*
Control	32.9 ± *33.22258065*	75.7 ± *75.83870968*

Based on the data above, it can be described the difference in the results of the average *pre-test* and post-test scores for the experimental class and the control class through a diagram as shown in Figure 1

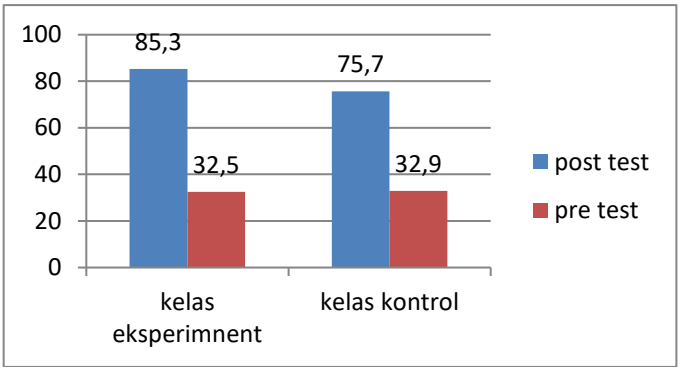

Figure 1 Average *pre-test* and *post-test results*

Normality test

to find out whether the data obtained is normally distributed or not using the Chi Square test at a significant level with a value of α = 0.005. Based on the normality test results obtained normal as follows.

Table 4. Normality Test Results

Class	**Data**	**(χ^2) Count**	**(χ^2) Table**	**A**	**Information**
Experiment	*Pre Test*	5,49	7.814728	0.05	Normal Distribution
	Posttest	12.83	7.814728		Normal Distribution
Control	*Pre Test*	8.37	7.814728	0.05	Normal Distribution
	Posttest	12.04	7.814728		Normal Distribution

Based on the table above it can be concluded that:

1. The normality test for experimental class student learning outcomes data obtained χ^2_{count} for *the pre test* 5.49 and χ^2_{count} for *the post test* 12.83. By taking the real level α = 0.05 and dk is 7.81. Based on the results of the data obtained, it can be seen that χ^2_{count} < Chi squared price (χ^2_{table}), it can be concluded that the data on student learning outcomes are normally distributed on the results of the pre test and $\chi^2_{count} > \chi^2_{table}$ it can be concluded that the data on learning outcomes in the experimental class normally distributed.
2. The normality test for the control class student learning outcomes data obtained χ^2_{count} for the pre test 8.37 for the post test 12.04. By taking the real level α = 0.05 and dk = 5 is

7.81. From the data obtained, it can be concluded that $\chi^2_{count} > \chi^2_{table}$, it can be concluded that the data on students' chemistry learning outcomes is normally distributed.

Hypothesis testing

This test is to find out whether the hypothesis in this study is accepted and the null hypothesis is rejected.

Table 5. Hypothesis Test Results

Data source	Class	χ^2	tCount	tTable	Information
Post test of learning outcomes	Experiment Control	85.70323 75.83871	4.530242	1.670649	Haha accepted

▪ CONCLUSIONS AND RECOMMENDATIONS

Based on research data and hypothesis testing, it can be concluded that there is a difference between students' chemistry learning outcomes taught using the *Problem Based Learning learning model* assisted by animated video media and direct learning models assisted by animated video media on Acid-Base Solution material. In the experimental class, the average *pre-test value was ± 33.22903226 and the post-test* average value was ± 85.70322581 and the *pre* -test average value in the control class was ± 33.22258065 and the *post-test* average value was ± 75 ,83870968. h ± 75.83870968. Based on the results and conclusions of the study, the researcher has several suggestions, namely: *The Problem Based* Learning learning model can be an alternative learning for teachers to improve students' chemistry learning outcomes in Acid-Base Solution material.The use of media in the form of animated videos can be used as an alternative in presenting material so that students are interested and don't feel bored while learning, because atomic structure material is more conceptual in nature. For future researchers who want to do more research on the *Problem Based Learning learning model* , do more supervision to get even better results.

• REFERENCE

Agang, et al., (2021). Penggunaan Video Pembelajaran Berbasis Integrasi Representasi Kimia Terhadap Peningkatan Hasil Belajar Kimia Siswa. *Jurnal Education and Development*, 9(4), 37-41.

Antara, et al., (2022). Model Pembelajaran Problem Based Learning Untuk Meningkatkan Hasil Belajar Kimia Pada Pokok Bahasan Termokimia. *Journal of Education Action Research*, 6(1).

Candra, et al., (2019). Analisis kemampuan berpikir kreatif peserta didik melalui penerapan blended project based learning. *Jurnal Inovasi Pendidikan Kimia*, 13(2), 2437-2446.

Damayanti, et al., 2018). Pengaruh Model Pembelajaran dan Minat Belajar Terhadap Hasil Belajar Kimia Peserta Didik Kelas XI IPA SMAN 1 Tinambung. *Saintifik*, 4(1), 47-53.

Darma, et al., (2021). *Statistika Penelitian Menggunakan SPSS.* Gue Pedia : Jawa Barat

Fauzan, et al., (2017). Penerapan Model Problem Based Learning Pada Pembelajaran Materi Sistem Tata Surya Untuk Meningkatkan Hasil Belajar Siswa. *Jurnal Pendidikan Sains Indonesia*, 5(1) : 27-35.

Fitri, et al., 2017). Meningkatkan Kemampuan Representasi Matematis melalui Penerapan

Model Problem Based Learning. *Jurnal Didaktik Matematika*, 4(1): 59 - 67

Ghozali. 2020. *Mengatasi Belajar Bahasa Arab.* Universitas KH. A Wahab Hasbullah: Jombang

Gultom, et al., (2022). Penerapan Model Pembelajaran Berbasis Proyek Pada Pembelajaran E-Learning Materi Kesetimbangan Kimia. Educenter: *Jurnal Ilmiah Pendidikan*, 1(4), 327-334.

Julia, et al., (2021). *Pengembangan Media Pembelajaran Musik Berbasis Digital Untuk Sekolah Dasar*. CV Caraka Khatulistiwa : Jawa Barat.

Lestari, et al.,. (2018). Kemampuan Pemecahan Masalah Matematis Siswa melalui Model Pembelajaran Learning Cycle 7E dan Problem Based Learning. Mosharafa: *Jurnal Pendidikan Matematika*, 7(3), 425-432

Maharani, et al., (2018). Analisis hubungan resiliensi matematik terhadap kemampuan pemecahan masalah siswa pada materi lingkaran. *JPMI (Jurnal Pembelajaran Matematika Inovatif)*, 1(5), 819-826.

Mewengkang, et al.,. (2020). Penerapan Media Pembelajaran Berbasis Video Animasi pada Materi Laju Reaksi dan Faktor-Faktor yang Mempengaruhi Laju Reaksi. *Oxygenius Journal Of Chemistry Education*, 2(1), 29-33

Misidawati, et al., (2021). Penerapan Model PBL dalam Matakuliah Teori Pengambilan Keputusan untuk Meningkatkan Kemampuan Berpikir Kritis Mahasiswa. *Jurnal Educatio FKIP UNMA*, 7(3), 922-928.

Mukhid. 2021. *Metodologi penelitian pendekatan kuantitatif*. CV Jakad Media Publishing: Surabaya

Muliaman, et al., (2020). Peningkatan Hasil Belajar Menggunakan Model Project Based Learning Pada Materi Laju Reaksi. *Chemistry in Education*, 9(2), 91-95.

Nabillah, et al., 2020). Faktor Penyebab Rendahnya Hasil Belajar Siswa. *Prosiding Sesiomadika*, 2(1c).

Novira, et al.,. (2021). Upaya Meningkatkan Hasil Belajar Kimia Siswa SMA Melalui Pengembangan Pembelajaran dengan Media Video Animasi Menggunakan Model PBL (Doctoral dissertation, UNIMED).

Nurrita, et al., (2018). Pengembangan Media Pembelajaran Untuk Meningkatkan Hasil Belajar Siswa. *Jurnal Ilmu Ilmu Alquran*, 3(1): 171- 187.

Paradina, et al., (2019). Pengaruh Model Pembelajaran Problem Based Learning Terhadap Hasil Belajar Siswa Di Kelas X. *Jurnal Kumparan Fisika*, 2(3 Desember), 169-176.

Purba, et al., (2021). Pengembangan Bahan Ajar Kimia Berbasis Proyek dengan Multimedia pada Materi Alkena di Sekolah Menengah Atas. *Jurnal Inovasi Pembelajaran Kimia (Journal Of Innovation in Chemistry Education)*, 3(1), 56-65.

Pusparini, et al., (2018)Pengaruh Model Pembelajaran Problem Based Learning (PBL) Terhadap Kemampuan Berpikir Kritis Siswa Pada Materi Sistem Koloid. *Jurnal Riset Pendidikan Kimia*, 8(1) : 35-42.

Robiyanto, A. (2021). Pengaruh Model Problem Based Learning terhadap Hasil Belajar Siswa. *Jurnal Pendidikan Guru Sekolah Dasar*, 2(1) : 114 - 121.

Rostika, D. (2020). Penerapan model pembelajaran kooperatif tipe STAD untuk meningkatkan hasil belajar kimia. *Indonesian Journal of Educational Development*, 1(2), 240-251.

Suci, et al., (2018). Meningkatkan Keterampilan Berpikir Kritis Peserta Didik pada Materi Asam Basa dengan Penerapan Model Pembelajaran Problem Based Learning (PBL) di SMAN 1 Gedeg Mojokerto. *UNESA Journal of Chemical Education*, 7(3).

Suswati, et al., (2021). Penerapan Problem Based Learning (Pbl) Meningkatkan Hasil Belajar Kimia. TEACHING: *Jurnal Inovasi Keguruan dan Ilmu Pendidikan*, 1(3),

127-136

Wahyuni, et al., (2018). Pengaruh Penggunaan Media Animasi Pada Materi Larutan Elektrolit Dan Nonelektrolit Terhadap Kemampuan Berfikir Kritis Siswa SMA. *Jurnal IPA & Pembelajaran IPA*, 2(1), 21-28.

Wigarasari, et al., (2021). Pengaruh Model Pembelajaran Problem-Based Learning Terhadap Penguasaan Konsep Dan Sikap Ilmiah Siswa Pada Pembelajaran Kimia Reaksi Redoks Kelas X Mipa Sma Negeri 7 Surakarta Tahun Pelajaran 2018/2019.*Jurnal Pendidikan Kimia*, 10(2) : 117-122.

Yanti, et al., (2017). Penerapan Model Problem Based Learning (Pbl) Terhadap Kemampuan Komunikasi Dan Kemampuan Pemecahan Masalah Matematika Siswa Sekolah Menengah Pertama Lubuklinggau. *Jurnal Pendidikan Matematika Raflesia*, 2(2) : 118- 129.