



## **Differences of Motivation and Learning Outcomes of Students Taught Using Learning Videos and PowerPoint on the Material of Acid and Base Solutions**

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**Abstract: Differences of Motivation and Learning Outcomes of Students Taught Using Learning Videos and PowerPoint on the Material of Acid and Base Solutions.** This study aims to determine the differences of motivation and learning outcomes as well as the correlation between motivation and learning outcomes of students taught using learning video media and PowerPoint in Problem Based Learning model learning on acid and base solution materials. This research method is a quasi experiment. The population in this study were all students of class XI MIA SMA Negeri 1 Sumbul and the samples were class XI MIA 6 and XI MIA 7 which were selected by purposive sampling technique. The results showed that there were differences in motivation and learning outcomes of students taught using learning videos and PowerPoints on the material of acid and base solutions. The average motivation of experimental class I was 79.94 and experimental class II was 74.89. The learning outcome of experimental class I was 82.29 and experimental class II was 78.06. Then, there is a correlation between motivation and learning outcomes of students taught using learning videos of 0.577 in the medium category and using PowerPoint of 0.495 in the medium category.

**Keywords:** Problem Based Learning, Learning Videos, PowerPoint, Motivation, Learning Outcomes

**Abstrak :** *Perbedaan Motivasi dan Hasil Belajar Siswa yang Dibelajarkan Menggunakan Video Pembelajaran dan PowerPoint pada Materi Larutan Asam dan Basa.* Penelitian ini bertujuan untuk mengetahui perbedaan motivasi dan hasil belajar serta korelasi antara motivasi dengan hasil belajar siswa yang dibelajarkan menggunakan media video pembelajaran dan PowerPoint dalam pembelajaram model Problem Based Learning pada materi larutan asam dan basa. Metode penelitian ini adalah kuasi eksperimen (eksperimen semu). Populasi dalam penelitian ini ialah seluruh siswa kelas XI MIA SMA Negeri 1 Sumbul dan sampel ialah kelas XI MIA 6 dan XI MIA 7 yang dipilih dengan menggunakan teknik purposive sampling. Dari penelitian, diperoleh hasil bahwasanya terdapat perbedaan motivasi dan hasil belajar siswa yang dibelajarkan menggunakan video pembelajaran dan PowerPoint pada materi larutan asam dan basa. Rata-rata motivasi kelas eksperimen I sebesar 79,94 dan eksperimen II sebesar 74,89. Hasil belajar kelas eksperimen I sebesar 82,29 dan eksperimen II sebesar 78,06. Kemudian, ada korelasi antara motivasi dan hasil belajar siswa yang dibelajarkan dengan menggunakan video pembelajaran sebesar 0,577 berada pada kategori sedang dan menggunakan PowerPoint sebesar 0,495 berada pada kategori sedang.

**Kata kunci:** *Problem Based Learning, Video Pembelajaran, PowerPoint, Motivasi, Hasil Belajar*

## • INTRODUCTION

Chemistry is one of the branch subjects in the natural sciences that learn the structure, composition, property, energy changes and the energy that comes with them (Meronda et al., 2021). One of the chemistry materials is acid and base solutions which includes the theory of acid and base, the strength of acid and base, measurement and calculation of pH and acid and base reaction (Kurniawan, 2020). Acid and base material is considered difficult because it contains complex, interconnected material, calculations and requires a deep understanding of concepts to understand it (Utami et al., 2020). Understanding acid and base material is very important because it is a prerequisite for learning further material such as salt hydrolysis and buffer solutions (Adriani et al., 2021).

Based on observations of SMA Negeri 1 Sumbul, information was obtained that the chemistry learning process still uses a conventional model with the lecture method. Learning is still teacher-centered and does not involve students in learning so that students are passive. In addition, teachers are still lacking in using varied learning media, namely still only using teaching materials in the form of printed books from the education office. Hence, learning tends to be boring so that students find it difficult to learn which has an impact on student learning outcomes which is still relatively low. This is evidenced by the data obtained that 30% of students have scores that are still below the criteria of minimum achievement (CMA) which is 75. Therefore, a learning innovation is needed in the form of applying various learning models and using media by teachers in teaching and learning process. A model that teachers can apply in learning is Problem Based Learning (PBL).

PBL is a model that encourages student participation by presenting students with a problem that requires them to actively problem solve and reach a conclusion by determining the actions or measures that must be taken (Permatasari et al., 2019). The PBL model with a scientific approach is one of several models recommended by the 2013 curriculum (Marpaung & Sutiani, 2020). The presentation of problems in PBL is designed with a context that is relevant to the material to be learned to encourage students to gain knowledge, conceptual understanding, critical thinking, independent bathing, group participation skills and problem-solving skills (Malmia et al., 2019).

In the process of teaching and learning, a teacher cannot be separated from use of learning media. It is used as a tool to facilitate the delivery of knowledge and material by teachers to students (Sapriyah, 2019). The media helps students in learning to achieve learning objectives and obtain good results (Wibowo et al., 2021). Learning media is very important because learning media can provide exciting learning process that can minimize student boredom (Donasari & Silaban, 2021). The use of media will motivate and stimulate students to remember what is learned and help understand learning materials (Nainggolan & Mutiah, 2020). Motivation is one of the factor that can affect student success in learning (Budiariawan, 2019). Therefore, through the use of learning video and PowerPoint in learning, students will be motivated to study harder so that student learning outcomes will be better.

Learning video media is one of the trends used as learning media during the current development of digital technology, namely era 4.0 (Putry et al., 2020). Learning video media has advantages, namely providing messages that can be received evenly by students, both in explaining the process, overcoming space and time limitations, can be stopped, and repeated as needed and gives a deep impression in influencing student attitudes (Harling, 2021). With the learning video media, chemical material that is abstract in nature can be conveyed more realistically to students, so they more easily understood material presented by teacher.

PowerPoint media is one of the media of choice for teachers in the learning process. The use of PowerPoint media can help teachers in improving teaching techniques, especially material that contains a lot of theory or explanation. With the PowerPoint media, students do not feel bored in learning because through PowerPoint, the material can be displayed on the screen interestingly (Sintia & Jasmi, 2022). PowerPoint can be used as a tool to display learning objectives, present information in the form of material to students and as multimedia in learning (Egolum & Igboanugo, 2019)

Previous relevant research has been carried out but only measuring aspects of learning outcomes has not measured other important aspects such as learning motivation. As has been done by Saragi & Dalimunthe (2022) which combines the application of the PBL model using PowerPoint on reaction rate material, the results of his research show that learning outcomes increase with an average pre-test of 25.29 and post-test of 80.88. Furthermore, research by Sembiring (2022) found there were difference of learning outcomes of students taught with video-assisted PBL and PowerPoint on reaction rate material. The average learning outcome with video learning is 80 and with powerpoint is 75.33. Based on this, the researcher feels the need for further research to determine the differences in motivation and learning outcomes of students taught with video and PowerPoint on the material of acid and base solutions.

## • METHOD

The method in this research is quasi-experiment. This research was conducted in January-February at SMA N 1 Sumbul. The population is all high school students in class XI MIA, totalling 7 classes. The samples are XI MIA 6 as an experiment class I which amounted to 35 people and XI MIA 7 as an experiment II which amounted to 36 people. Samples were chosen with purposive sampling techniques. Experiment class I was taught with PBL model assisted learning video and experiment II with PBL assisted by PowerPoint.

The procedure in this study is organized into three steps, namely: 1) Preparation Stage, including: observation, formulating problems, preparing lesson plans, compiling and validating instruments and learning media, conducting trials and analyzing instruments; 2) The Implementation Stage, including: determining the sample, distributing pre-test questions, implementing learning, distributing post-test questions and motivation questionnaires; 3) The final stage includes: processing or analysing data and making conclusions.

The instruments used are pre-test and post-test questions totalling 20 and non-tests in the form of a motivation questionnaire totalling 30 statements. Before the instrument was used, the researchers first prepared 40 grids. The grids were validated to expert lecturers and then tested on students. After the test was carried out, the validity, reliability, level of complexity and differentiating power have been tested.

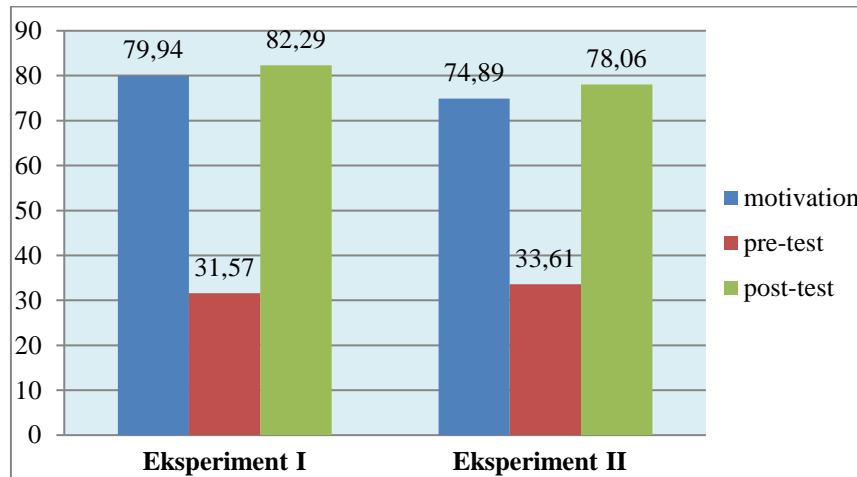
Data analysis technique includes pre-requisite test which consists of homogeneity test and hypothesis test. After that, hypothesis test was conducted using two-party t test and correlation test between motivation and learning outcomes.

## • RESULT AND DISCUSSION

The results are acquired in this study are described as follows:

### 1. Student Motivation and Learning Outcomes Data

Data acquired are data on student learning motivation, pre-test and post-test. The average data experiment class I and experiment II can be seen in Figure 1 below.



**Figure 1.** Graph of Student Motivation and Learning Outcomes Data

The graph in Figure 1 shows that the average motivation of experiment class I was 79.94, the pre-test value was 31.57 and the post-test was 82.29. While in the experiment II, the motivation was 74.89, the pre-test value was 33.61, and the post-test was 78.06.

### 2. Data Normality Test

The normality was measured using the Chi Square test at a significance level of  $\alpha = 0.05$ . The results test can be seen in Table 1 below:

**Table 1.** Normality Test of Learning Outcomes and Motivation Data

Class	Data	$\chi^2_{\text{count}}$	$\chi^2_{\text{table}}$	$\alpha$	Description
Experiment I	Motivation	8.870	11.07	0.05	Normally
	Pre-test	10.555	11.07	0.05	Normally
	Post-test	7.657	11.07	0.05	Normally
Experiment II	Motivation	9.295	11.07	0.05	Normally
	Pre-test	6.818	11.07	0.05	Normally
	Post-test	9.824	11.07	0.05	Normally

The data in Table 1 shows that the motivation, pre-test and post-test data are normally distributed.

### 3. Data Homogeneity Test

The results of the homogeneity test conducted in this study can be seen in Table 2 below:

**Table 2.** Homogeneity Test of Learning Outcomes and Motivation Data

Class	Data	F <sub>count</sub>	F <sub>table</sub>	Description
Experiment I	Motivation	1.285	1.762	Homogeneous
Experiment II	Pre-test	1.149	1.762	Homogeneous
	Post-test	1.197	1.762	Homogeneous

The data in Table 2 shows that the motivation, pre-test and post-test data are homogeneous.

#### 4. N- Gain Test

The results N-Gain of learning outcomes data of experiment class I and experiment II can be seen in Table 3 below:

**Table 3.** N- Gain Test

Class	Gain Average	% Gain	Category
Experiment I	0.7442	74.42%	High
Experiment II	0.6742	67.42%	Medium

The data in Table 3 shows that the improvement in learning outcomes in experiment I was 74.42% with a high category and experiment II was 67.42% with a medium category.

#### 5. Hypothesis Test.

Hypothesis testing is done through two-party t-test and correlation test. Hypothesis testing is explained as follows :

**Table 4.** Hypothesis Test I (Learning Motivation Data)

Class	$\bar{X}$	Varians	$t_{\text{count}}$	$t_{\text{table}}$	$\alpha$	Conclusions
Experiment I	79.94	66.291	2.755	1.99	0.05	Ho denied,
Experiment II	74.89	51.587				Ha accepted

The data in Table 4 shows the value of  $t_{\text{count}} > t_{\text{table}}$  ( $2.755 > 1.99$ ), then  $H_a$  is accepted. It is meaning there are differences of learning motivation taught with PBL assisted by videos and PowerPoint on acid and base solution material.

**Table 5.** Hypothesis Test II (Learning Outcome Data)

Class	$\bar{X}$	Varians	$t_{\text{count}}$	$t_{\text{table}}$	$\alpha$	Conclusions
Experiment I	82.29	63.739	2.313	1.99	0.05	Ho denied,
Experiment II	78.06	53.524				Ha accepted

The data in Table 5 shows the value of  $t_{\text{count}} > t_{\text{table}}$  ( $2.313 > 1.99$ ), then  $H_a$  is accepted. It is meaning there are differences of learning outcomes taught with PBL assisted by video and PowerPoint on acid and base solution material.

**Table 6.** Hypothesis Test III (Correlations Motivations and Learning Outcome in Experiment Class I)

Class	$r_{\text{count}}$	$r_{\text{table}}$	$\alpha$	Conclusions	Descriptions
Experiment I	0.577	0.334	0.05	Ho denied, Ha accepted	medium

The data in Table 6 shows the value of  $r_{\text{count}} > r_{\text{table}}$  ( $0.577 > 0.334$ ), then  $H_a$  is accepted. It is meaning there is a correlation motivation and learning outcomes taught with PBL assisted by video on acid and base solution material.

**Table 7.** Hypothesis Test IV (Correlations Motivations and Learning Outcome in Experiment Class II)

Class	$r_{\text{count}}$	$r_{\text{table}}$	$\alpha$	Conclusions	Descriptions
Experiment II	0.495	0.329	0.05	Ho denied, Ha accepted	medium

The data in Table 7 shows the value of  $r_{\text{count}} > r_{\text{table}}$  ( $0.495 > 0.329$ ), then  $H_a$  is accepted. It's meaning there is a correlation motivation and learning outcomes taught with PBL assisted by PowePoint on acid and base solution material.

Learning in this study was carried out based on the PBL model combined with the use of learning video and PowerPoint. Experimental class I used learning video while experimental class II used PowerPoint media.

In hypothesis test I, obtained  $t_{\text{count}} > t_{\text{table}}$  ( $2.755 > 1.99$ ), then  $H_a$  is accepted. Meaning there is a difference of learning motivation taught with PBL assisted by learning videos and PowerPoint. The mean value of learning motivation of experimental I was obtained at 79.94 and experiment II at 74.89. Both the mean motivation of student learning outcomes in both experiments I and II is a high category. The motivation value of experiment I is higher than experimental class II, meaning that students are more motivated to be taught with PBL model assisted by learning video media than PowerPoint media.

In hypothesis test II, obtained  $t_{\text{count}} > t_{\text{table}}$  ( $2.313 > 1.99$ ), then  $H_a$  is accepted. Meaning there are differences of learning outcomes taught with PBL assisted video and PowerPoint on acid and base solution material. The average pre-test of experiment I was 31.57 and post-test was 82.29 with N-Gain 74.35% (high). While the mean pre-test of experiment II was 33.61 and post-test was 78.06 N-Gain 67.10% (medium). The increase in learning outcomes of experiment I is higher than experiment II, meaning that learning PBL models assisted by learning video media is better in improve learning outcomes than PowerPoint media. The same results have been obtained in Sembiring (2022) research. The average learning outcomes with learning videos amounted to 80 and with PowerPoint amounted to 75.33.

The relation of learning motivation and student learning outcomes is seen in hypothesis testing III and IV. The results of testing hypothesis III obtained  $r_{\text{count}} > r_{\text{table}}$  ( $0.577 > 0.361$ ), then  $H_a$  is accepted. Meaning there are difference there is a correlation between motivation and learning outcomes taught with PBL assisted by video on acid and base solution material. The relationship obtained is in the medium category. Then, the results of testing hypothesis IV obtained  $r_{\text{count}} > r_{\text{table}}$  ( $0.495 > 0.329$ ), then  $H_a$  is accepted. Meaning there is a correlation between motivation and learning outcomes taught with PBL assisted by PowerPoint with moderate relationship category. Some previous studies have found that there is a correlation between motivation and chemistry learning outcomes including research by Marpaung & Simorangkir (2021) and Aritonang & Zubir (2022). The relationship means that the more students are motivated to learn, the better their learning outcomes.

The class be taught with the PBL using learning video media obtained higher motivation and learning outcomes than the class taught with the PBL using PowerPoint.

This is because learning video media is more interesting because it contains moving animated images and audio so that it attracts students attention to pay attention to learning material impressions. This can be seen in the behavior of students where in experiment class I which is taught using video media, students have higher enthusiasm in participating in learning than experiment II taught using PowerPoint media. Students are more enthusiastic about learning with learning videos than PowerPoint because the video media display is more interesting because it presents moving images (visuals) accompanied by sound (audio).

## • CONCLUSION

According to the research, concluded that there are differences of motivation and learning outcomes of students taught with PBL models using learning video media and PowerPoint on the material of acid and base solutions. Then, there is a correlation between student motivation and learning outcomes taught with PBL assisted by learning video media and PBL assisted by PowerPoint media. Learning by using learning videos is better and more effective in motivating and improving learning outcomes than PowerPoint.

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