

The Effect of e-Magazine in the Discovery Learning Model on the Learning Outcomes of Students in Class X SMA Negeri 8 Selayar (Study on Oxidation Reduction Subject Matter)

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ABSTRACT

The quasi-experimental research aims to determine the effect of e-Magazine in the Discovery Learning model on the learning outcomes of students of class X SMAN 8 Selayar on the main material of oxidation-reduction reaction. The research design used is a posttest-only control group design. The research population was all of class X MIA with a total of 2 (two) classes consisting of 50 students. Sampling in this study was carried out using the random technique. The sample in the study was Class X MIA 1 as an experimental group and X MIA 2 as the control group of 25 people each. The research used are tests of learning outcomes and observation sheets of learning implementation. The results of descriptive statistical analysis of the experimental group obtained a learning outcome average of 80,72 and a control group of 78,00. The results of an inferential statistical analysis of learners' learning outcomes showed that experimental group and control group data is homogeneous but not normally distributed population. Because the data is not normally distributed, so the hypothesis test used is the Mann-Whitney test. The hypothesis test result obtained the value of $Z_{hitung} > Z_{tabel}$ ($1,65 > 1,64$). This shows that there is the effect of e-Magazine on the Discovery Learning model to the learning outcomes of Class X of SMAN 8 Selayar on the subject matter of oxidation-reduction reaction

Keywords: e-Magazine, Discovery Learning, Learning Outcomes

INTRODUCTION

Education has an important role in developing Indonesia's human resources. Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have spiritual, religious, self-control, personality, intelligence, and noble character, as well as skills needed by themselves, society, and nation and state. The purpose of education is to develop and shape the character and civilization of a dignified nation to educate the nation's life (Kemendikbud, 2013).

Education is aimed at developing the potential of students, attitudes, and skills that can be used in living life in society, nation, and state. Education in Indonesia currently uses the 2013 curriculum, which is competency-based by strengthening authentic learning and assessment processes to achieve competency in attitudes, knowledge, and skills.

a lesson taught in the learning process that is closely related to everyday life. Starting from the fields of industry, food, agriculture, and animal husbandry to the health sector, everything is related to chemistry so learning chemistry should be an interesting lesson for students in learning chemistry. In the context of educational reform, three issues need to be highlighted, namely curriculum renewal, improving the quality of learning, and the effectiveness of learning methods. Learning methods have a big enough share in learning activities. The abilities that are expected to be possessed by students are determined by the relevance of using a method that is suitable for the purpose.

here are four learning models that are emphasized to be applied in the 2013 curriculum, namely the problem-based learning model (Problem Based Learning), the inquiry learning model (Inquiry-Based Learning), the discovery-based learning model (Discovery Learning), and the project-based learning model (Project Based Learning). These models are carried out using the STEAM approach. Through the Discovery learning model with a scientific approach, students are allowed to think, find, argue, and work together through scientific learning activities, so that they can train and improve students ability to solve problems. This scientific approach emphasizes students be active in the learning process so that they can form creative, innovative students through strengthening attitudes, skills, and knowledge (Daryono, 2014).

Based on the results of observations and interviews with chemistry teachers, information was obtained that there were still problems in chemistry learning activities at SMA Negeri 8 Selayar, especially in class X. the learning model used is conventional learning, there have also been discussions in the learning process but it is less effective because of the lack of feedback from students. This is because several factors are still carried away by the old culture, namely the learning process that is still teacher-centered. The next supporting data obtained from interviews with teachers, namely student learning outcomes for the material for oxidation-reduction reactions have not met the KKM. The KKM at SMA Negeri 8 Selayar for chemistry subjects is 75 while the average value of students for the material for reduction and oxidation reactions is still below the KKM, which is 70.

Several factors influence student learning outcomes which will have implications for the quality of education. The factors that affect the learning process are grouped into three main categories, namely teachers, learning content or materials, and students. The interaction between the three main components involves learning models, learning media, and structuring the learning environment (Anisa, 2017). The learning media that will be used in this research is e-Magazine and the learning model that will be used in this research is the discovery learning model.

The e-Magazine is an electronic magazine (electronic magazine). Electronic magazines no longer use paper to write articles like magazines in general but in the form of digital files that can be accessed through electronic media such as computers, mobile phones, android, iPhones, and iPad (Nurjannah, 2014). The e-Magazine learning media is one of the breakthroughs in the use of technology to improve the quality of learning in the classroom. Learning resources have a very large role in the learning process so they need to be developed and managed in a systematic, quality, and functional manner (Fuad, 2020). The use of media in electronic form is in line with the current development of Generation Z. In general, Generation Z accepts and is quite enthusiastic about the use of technology in everyday life, including the use of technology in the learning process (Hastini, 2020).

The discovery learning model is a model that presents learning material not yet in its final form so that students are expected to be able to organize their material received while playing an active role in the learning process. In the discovery learning model, the problem faced by students is a kind of problem engineered by the teacher. So students are required to carry out various activities to collect information, compare, categorize, analyze, and draw conclusions. Discovery occurs when the individual is primarily involved in the use of his mental processes to find a concept or principle. Discovery is done through observation, clarification, measurement, prediction, determination, and inference (Darmadi, 2017).

In multiplying the discovery learning model, the teacher acts as a mentor by providing opportunities for students to learn actively and directing students' learning activities according to the objectives. Teachers occupy a strategic position in creating a conducive and fun learning atmosphere to direct students to achieve optimal learning goals. Therefore, a teacher is required to position himself dynamically and flexibly, both as a facilitator, mediator, instructor, evaluator, and manager for the creation of dynamic and innovative learning activities (Lefudin, 2017).

The advantages of the discovery learning model are as follows: a) can develop individual talents and skills; b) students learn by utilizing various types of learning resources; c) increasing appreciation for students; d) encourage students to think intuitively

in formulating their hypotheses; e) assist in developing memory and transfer to new learning situations; f) helping students involve their minds and motivations in learning activities; g) create a sense of pleasure in students; h) the knowledge gained is very personal and i) improve and enhance skills (Darmadi, 2017).

The above background underlies the research on the effect of e-Magazine on the discovery learning model on the learning outcomes of the tenth-grade students of SMA Negeri 8 Selayar on the subject matter of Oxidation-Reduction Reactions.

METHOD

This research is quasi-experimental research (quasi-experimental) that aims to determine the effect of e-Magazine on the discovery learning model on the learning outcomes of students of class X SMA Negeri 8 Selayar on the subject matter of reduction and oxidation reactions. The research design used in this study is the Posttest-Only Control Design. In the Posttest-Only Control Design, a posttest will be given to determine student learning outcomes.

The variables in this study consisted of two kinds, namely the independent variable (independent) and the dependent variable (dependent). The independent variable is e-Magazine in the discovery learning model and without e-Magazine in the discovery learning model. The dependent variable is the learning outcomes of students in class X SMA Negeri 8 Selayar on the subject matter of oxidation-reduction reactions.

The population in this study were all students of class X SMA Negeri 8 Selayar for the academic year 2021/2022 which consisted of two classes. All class X SMA Negeri 8 Selayar have the same level of ability.

The sampling technique in this study is a simple random sampling technique, namely taking a group of samples from the population at random. Of the two classes, one class was chosen as the experimental group, namely class X MIA 1, and the control group, namely class X MIA 2. This learning activity was carried out in the even semester of the 2021/2022 academic year at SMA Negeri 8 Selayar, South Sulawesi Province.

The instrument used in this study was a test of chemistry learning outcomes aimed at measuring the cognitive aspects of students after participating in the learning process. Data collection on learning outcomes was carried out by giving a final test (posttest) to the experimental group and the control group. The final test (posttest) is given in the form of multiple choice questions consisting of 24 items with five answer choices. Each correct answer was given a score of 1 and the wrong answer was given a score of 0. The test results

from these two groups were then compared to determine whether there was an effect of e-Magazine on the Discovery Learning Model on the students' learning outcomes on the material of the oxidation-reduction reaction.

RESULTS AND DISCUSSION

Research result

Descriptive statistical analysis was used to describe or provide a general description of the characteristics of achievement of learning outcomes in chemistry at SMA Negeri 8 Selayar for the material for oxidation-reduction reactions in the experimental group and the control group. Based on the results of descriptive statistical analysis of the learning outcomes of class X MIA 1 as the experimental group taught with e-Magazine on the Discovery Learning model and class X MIA 2 as a control group taught using the Discovery Learning Model without e-Magazine, the data obtained from the participants' learning outcomes. teach according to Table 1.

Table 1. Description of Student Learning Outcomes in the Experimental Group and Control Group

NO	Descriptive statistics	Statistical Value (Posttest)	
		Experimental Group	Control Group
1.	Sample size	25	25
2.	Highest value	100	100
3.	Lowest value	29	58
4.	Average value	80,72	78,00
5.	Median	82,1	78,3
6.	Mode	83,50	78,83
7.	Standard deviation	13,06	12,82

The value obtained by students in the experimental group and the control group based on the standard of completeness of chemistry learning outcomes for class X SMAN 8 Selayar can be seen in Table 2.

Table 2. Percentage of Complete Learning Outcomes of Students

Value	Criteria	Experimental Group		Control Group	
		F	%	F	%
≥ 75	Complete	22	88%	18	72%
< 75	Not Complete	3	12%	7	28%
Total		25	100%	25	100%

Table 2 shows that the learning outcomes achieved by students in the experimental group who were taught using e-Magazine on the Discovery Learning Model were higher than the learning outcomes of students in the control group who were taught using the Discovery Learning Model without e-Magazine.

Inferential statistical analysis was used to test the research hypothesis, namely the effect of e-Magazine on the Discovery Learning Model on student learning outcomes. However, before testing the hypothesis, a prerequisite test is carried out, namely the normality test and homogeneity test. Both of these tests are assumptions in hypothesis testing.

a. Prerequisite Test

1). Normality test

Based on the results of calculations, the experimental group obtained $\chi^2_{\text{count}} = 29,12$ and the control group obtained $\chi^2_{\text{count}} = 192,50$. The value at the significance level (α) = 0.05 and the degrees of freedom (dk) = 3 obtained the value of $\chi^2_{\text{table}} = 7.815$. From the results of this calculation, we can see that in the experimental group and control group, each class obtained a value of $\chi^2_{\text{count}} > \chi^2_{\text{table}}$. It can be concluded that the samples in the experimental group and control group were not normally distributed. In detail can be seen in Table 3.

Table. 3 Results of the Normality Test of Student Learning Outcomes in the Experimental Group and the Control Group

Class	χ^2_{hitung}	$\chi^2_{\text{tabel}} (\alpha) = 0,05$	Conclusion
Experiment	29,12	7,815	Not Normal Distributed

Control	192,50	7,815	Not Normal Distributed
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2). *Homogeneity Test*

Based on the results of the calculation of the homogeneity test, the value of $F_{count} = 1.03$ and the value of F_{table} at a significant level of 0.05 was 1.99. The value of F_{count} ($1.03 < F_{table}$ (1.99)), so it can be concluded that the two groups, namely the experimental group and the control group, came from homogeneous variance. The results of the homogeneity test of the experimental group and the experimental group students' learning outcomes can be seen in Table 4.

Table 4. Results of Homogeneity of Learning Outcomes of Students in Experiment Group and Control Group

Class	Z_{hitung}	$F_{tabel} (\alpha) = 0,05$	Conclusion
Experiment	1,03	1,99	Homogeneous
Control			

b. Hypothesis testing

Hypothesis testing was conducted to determine whether there was an effect of Nearpod interactive media in the Discovery Learning Model on student learning outcomes. Hypothesis testing in this study was carried out by a one-party statistical test with the formulation of the hypothesis as follows:

$$H_0: Z_{count} \leq Z_{table}$$

$$H_1: Z_{count} > Z_{table}$$

After conducting prerequisite tests (normality test and homogeneity test), it was found that the normality of the experimental group and control group came from populations that were not normally distributed. And both groups come from homogeneous variance, so hypothesis testing cannot be done using parametric statistical tests (t-test), but hypothesis testing can be done using non-parametric statistical tests, namely the Mann-Whitney test.

Based on the calculation of student learning outcomes using the Mann-Whitney test, it was obtained that $Z_{count} = 1.65$ and the value of Z_{table} at a significance level of 0.05 was 1.64 significant showed that the value of $Z_{count} > Z_{table}$ ($1.65 > 1.64$). This shows that H_0 was rejected and H_1 is accepted. So it can be concluded that there is an effect of Nearpod interactive media in the Discovery Learning Model on student learning outcomes.

Table 5. Hypothesis Test Results of Student Learning Outcomes

Class	Total	Z _{hitung}	Z _{tabel} (α) = 0,05	Conclusion
Experiment	25	1,65	1,64	H ₀ rejected
Control	25			

Discussion

This study aims to determine the effect of e-Magazine on the Discovery Learning Model on the learning outcomes of class X students of SMAN 8 Selayar on the subject matter of oxidation-reduction reactions. Two classes are used as research samples, namely class X MIA 1 as the experimental class and class X MIA 2 as the control class. The experimental class was given learning with e-Magazine on the Discovery Learning Model. While the control class used the Discovery Learning Model without e-Magazine. The research was carried out in six meetings for each class, including five meetings for giving material and one meeting for giving post-tests.

The use of e-Magazine in chemistry learning through the Discovery Learning Model makes students in the experimental group obtain higher learning outcomes than those in the control group. This is due to the use of e-Magazine which can motivate students to focus on studying and diligently work on problems that arise at the Discovery Learning stage so that students are more stimulated to follow the learning process to make students more active, and teachers can be more flexible. guide each student.

This is in line with research conducted by [9] which states that e-Magazines used during the learning process can attract students' learning processes to be more active and varied. Based on the results of research conducted in the experimental group using e-Magazine in the Discovery learning model by displaying videos on the stimulus syntax and also at the data collection stage, can be seen in Figure 1.

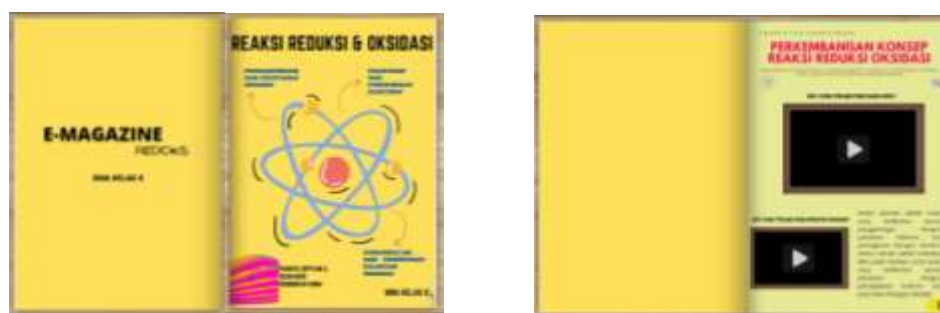


Figure 1. Display of e-Magazine

Characteristics of oxidation-reduction reaction materials that require understanding concepts (binding and releasing oxygen, electrons, and hydrogen, as well as increasing and decreasing oxidation numbers), and applicative understanding (oxidation-reduction reactions in everyday life) make students experience difficulties in studying the material. The use of e-Magazine on oxidation-reduction reaction material can help students to be more motivated in following the learning process because they are presented with an attractive display and centered on important learning points. This makes students more enthusiastic about understanding the learning material so that their learning activities increase.

The truth of a hypothesis is proven through hypothesis testing. However, before testing the hypothesis, a prerequisite test was first carried out, namely normality and homogeneity tests. Based on the prerequisite analysis test, it was stated that the data from the experimental group and the control group came from populations that were not normally distributed and both groups came from homogeneous variance. Therefore, hypothesis testing was carried out using nonparametric statistical tests (Mann-Whitney test). The results of testing the learning outcomes hypothesis obtained the value of $Z_{count} > Z_{table}$, which means the proposed hypothesis is accepted. So, it can be concluded that there is an effect of e-Magazine on the learning outcomes of class X students of SMAN 8 Selayar on the oxidation-reduction reaction material.

The results of the hypothesis test show that the value of $z_{count} = 1.65$ and the value of z_{table} at a confidence level of 0.05 is 1.64. From these data, it can be seen that $z_{count} (1.65) > z_{table} (1.64)$. This shows that H_0 is rejected and H_1 is accepted and it is concluded that there is an effect of e-Magazine on the discovery learning model on the learning outcomes of class X students of SMAN 8 Selayar on oxidation-reduction reaction material. This is in line with the theory [10], learning outcomes are results that have been obtained by students based on the experiences or exercises they have followed during learning in the form of cognitive, affective, and psychomotor skills.

CONCLUSION

Based on the results of data analysis and discussion, the results of statistical analysis showed that the average learning outcome of the experimental class was 80.72 which was higher than the control class, which was 78, and the value of $z_{count} (1.65) > z_{table} (1.64)$, it can be concluded that H_0 is rejected and H_1 is accepted, meaning that there is an effect of e-Magazine on the discovery learning model on the learning outcomes of students of class X SMAN 8 Selayar on the oxidation-reduction reaction material. Based on the results of

these studies, theoretical implications can be stated, namely, the selection of the right learning media can affect the learning outcomes of students.

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