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## The Effect of Using Netsupport School Software on Environmental Pollution Subject Matter on Student Learning Outcomes

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#### ABSTRACT

This study aims to determine the effect of using NetSupport School software on environmental pollution subject matter on student learning outcomes. This is a quasi-experimental research. The research design used is a posttest only control group design. The research sample consisted of three groups taken randomly. The first group is the control group which does not use learning multimedia, the second group is experiment group 1 which uses an LCD projector, and the third group is experiment group 2 using NetSupport School software. The data collection instruments are in the form of posttest questions and affective questionnaire sheets. The data analysis technique was carried out using the One-Way ANOVA test. The results showed that: 1). hypothesis testing of cognitive learning outcomes showed that there was a significant effect on all groups. Of the three groups, experiment group 2 had the highest mean value. 2). the hypothesis test of affective learning outcomes showed that there was a significant effect on all groups. Of the highest mean value. Based on these results, it is concluded that the NetSupport School software application has a significant effect on students' cognitive and affective learning outcomes.

Keywords: NetSupport School, learning multimedia, cognitive learning outcomes, affective learning outcomes

#### **INTRODUCTION**

The development of information and communication technology that covers all areas of life makes it easier for everyone to access media and other sources of information. In the field of education, the information technology revolution is an opportunity and challenge for teachers to improve their professionalism. (Darmadi, 2009, p. 68)

The word multimedia comes from two words, namely multi which means many, and media which means tool. So, multimedia-based learning can be interpreted as a variety of facilities that can be utilized in the learning process. The use of media in learning is expected to play an important role in improving student academic achievement (Benson & Odera, 2013, p. 16). The learning media is very diverse, be it in the form of print media, teaching aids, or electronic media (Fidianto, 2007, p. 8).

According to Mayer (2014, p. 2), Multimedia-based learning is learning that uses words (both spoken and written) and images (illustrations, photos, animations, and videos). Learning that uses both (words and pictures) will have better results compared to using only one of them.

Research conducted by Mayer & Estrella (2014, p. 17) shows that multimedia-based learning by designing learning resources in the form of pictures that are more emotionally attractive is student proven to improve learning outcomes. Therefore, multimedia-based learning environmental pollution on material is assumed to affect student learning outcomes because it will provide a more realistic experience to students through the media displayed. These various media can present real examples of pollution that occurs so that students will be emotionally more motivated and concentrate on the learning process.

According to the cognitive theory of multimedia learning, meaningful learning involves three cognitive processes, namely organizing, and selecting. integrating. Multimedia information from outside enters through the eyes or ears and is recorded in the sensory memory. Information in this sensory memory will be partially selected to be continued into working memory. In working memory, information is organized into visual or verbal types of information. Both types of information are then integrated with previous knowledge that has been stored in long-term memory. By utilizing multimedia in learning, learning will become more meaningful (Mayer & Estrella, 2014, p. 13; Mayer, 2009; & Sweller, 2011).

Netsupport School (NSS) is a computer application program that runs on several computers or smartphones connected to a network. This program can make it easier for teachers to design and organize learning activities, such as preparing and presenting material in various types of displays or media, assigning assignments, accessing learning resources, and carrying out learning evaluations. This program can also control a computer remotely via a computer network (Suratno, n.d., p. 1).

NSS software makes it easy for teachers to deliver their lessons in an organized and controlled manner. For example, in internet applications, teachers can restrict their students from accessing websites that are considered negative (filtration) (Ibrahim, n.d., p. 2). Through this software, the sharing of information or data between computers can occur. The series of computers are arranged into a client-server as shown in Figure 1, where the server computer (it looks like in Figure 2) is a computer operated by the teacher and the client computer is a computer operated by students.



Picture 1. NSS Software Application Schematic (Source: Suratno, n.d.)



Picture 2. Server Computer Screen (Teacher)

The benefits of using NSS applications 1). help teachers maximize include: teaching time and ensure students stay focused on the learning process; 2). improve student learning outcomes because teachers can actively engage with students and keep the whole group focused and on track, monitoring and controlling time. Meanwhile, the use of formative assessment features in the form of games can encourage student participation and competition while highlighting gaps in students' understanding and knowledge; and 3). protect students and support their learning motivation. By showing student or teacher screens to the class it can keep the use of information positive. NSS can also be used to properly promote a digital citizenship culture. A suite of eSafety tools helps create a safe learning environment, while a student feedback mode gives teachers insight into students' interests and whether they need more help. (School, 2021).

Another type of multimedia that will be used in this study as a comparison is LCD projector. We often encounter LCD projector media in every learning process today. LCD projector learning media is a combination of a computer or laptop with a projector. The LCD projector is the hardware, while the program that has been designed and compiled in the laptop is the software.

LCD stands for Liquid Crystal Display which is a thin, flat display device made of several colors or pixel color arrays in front of a light source or reflector. They are often used in battery-powered electronics because they use a very small amount of electrical energy. LCD projector learning is a combination of a computer or laptop with a projector. An LCD projector is a hardware, while the program that has been designed and arranged in the laptop is the software. LCD projectors are included in the category of motion audiovisual media because they can present various information displays in the form of audio, still visuals, motion visuals, or a combination of motion audiovisuals. (Haryono, 2010, p. 13).

The dependent variable in this study is cognitive and affective learning outcomes. Cognitive learning outcomes are behavioral changes that occur in the area of cognition. The learning process that involves cognition includes activities starting from the reception of external stimuli by sensory, storage, and processing in the brain into information to recalling information when needed to solve problems. Bloom divides and arranges hierarchically the level of cognitive learning outcomes starting from the simplest, namely memorization to the highest and most complex, namely the evaluation as follows: a) the ability to memorize (knowledge) is the lowest cognitive ability. This ability is the ability to recall facts stored in the brain. b) the ability to understand (comprehension) is the ability to see the relationship between facts and facts. Memorizing facts is not enough because understanding requires knowledge of facts and their relationships. c) the ability to apply (application) is the cognitive ability to understand the rules, laws, formulas, and so on that are used to solve problems. d) analytical ability (analysis) is the ability to understand something by breaking it down into elements. e) the ability to synthesis is the ability to understand by organizing the parts into a whole. f) evaluation ability is the ability to make judgments and make decisions from the results of the assessment (Purwanto, 2008, pp. 44–45).

Affective learning outcomes are the ability to accept or reject objects based on an assessment of the object. Affective ability is also interpreted as an attitude in the form of internalizing and externalizing values, where attitude is the ability to make values as standards of behavior. (Suprijono, 2010, p. 6). The taxonomy of affective learning outcomes is divided into 5 levels by Krathwohl, namely acceptance, participation, assessment, organization, and internalization (Sudjana, 2009, pp. 52–53).

Based on the results of observations in class X MA Mu'allimin Muhammadiyah Yogyakarta, it shows that the average value of biology lessons on the mid-semester exam of 67, 65 has not reached the Minimum Graduation Criteria, which is 70. At the time of observation three times, there were still many students who joked, daydreamed. and sleeping during the learning process. They seem unmotivated in following the learning process. This is because the learning process tends to be boring with the design and learning media used less attractive and verbalized.

Research results by Saputra, Ismet, & Andrizal (2018, p. 29) concluded that learning motivation has a positive and significant influence on student learning outcomes. Therefore, efforts to generate student learning motivation through the use of multimedia learning, one of which is using learning software that attracts students' interest is quite important to do. From the above phenomena, the authors assume that using NSS software can bring about changes in the learning process to improve student biology learning outcomes. Therefore, this study aims to 1). knowing the difference in the effect of LCD Projector multimedia applications and NSS software on biology learning outcomes on students' cognitive aspects; 2). knowing the difference in the effect of LCD projector multimedia applications and NSS software on biology learning outcomes on students' affective aspects.

In general, the factors that influence student learning can be divided into three types, namely internal, external, and learning approaches. Internal factors in the form of physiological aspects, namely general physical conditions, psychological aspects, intelligence, attitudes, talents, motivations, and interests. External factors in the form of social and non-social environment. Learning approach factors learning include strategies, facilities. learning resources, methods, and learning media (Syah Muhibbin, 2010, pp. 129–136).

Research on the application of the NSS program has not been widely carried out, but several studies are quite relevant to this research. The first research was conducted by Surya (2019) entitled "Netsupport School Application-Based Teaching in Improving Student Learning Outcomes". This research proves that the development of teaching materials based on NSS applications can improve student learning outcomes. The next research was conducted by Suratno, (n.d.), with the title "Learning Using NSS to Improve Students' Cognitiveness in Learning Information and Communication Technology (ICT) (Quasi-Experimental Study of Class XI students at SMA Negeri 14 Bandung)" The results of this study indicate that students who use learning models using NSS have better learning outcomes than with students who get conventional learning models. This research has similarities with previous research, namely the similarity in the application of NSS in an effort to improve students' cognitive learning outcomes.

The difference between this research and the research that has been done is that in this study the application of NSS is compared to LCD projectors. In previous studies, only cognitive learning outcomes were measured, while in this study the aspects measured included cognitive and affective learning outcomes. Affective learning outcomes are important to measure because it relates to student acceptance of the media (NSS software) used which of course will affect student learning success.

The hypotheses in this study are as follows:

a. there are differences in the effect of LCD projector multimedia applications and NSS software on biology learning outcomes in students' cognitive aspects.

b. there are differences in the effect of LCD projector multimedia applications and NSS software on biology learning outcomes in students' affective aspects.

# **RESEARCH METHODS**

This research belongs to the Quasi-Experimental research. In experimental research there is treatment. Therefore, the experimental research method interpreted as a research method used to find the effect of others certain treatments on under controlled conditions. (Sugiyono, 2010, p. 107). The experiment group in this study consisted of two classes, namely the class that used the LCD projector learning media, and the class that used the NSS software media. Between LCD media and NSS software, their effectiveness in improving student learning outcomes in cognitive and affective aspects will be compared. The subjects studied in the two groups were taken randomly. Random sampling, only possible if the subjects have the same characteristics (Sudjana, 2009, p. 203).

The design used in this study was a Randomized Post-test Only Comparison Control Group Design. The pattern is as follows (Sukmadinata, 2009, p. 203):

 Table 1. Experimental Design Pattern

No.	Group	Experiment	Post-test	
1.	$R_1$	-	$O_1$	
2.	<b>R</b> <sub>2</sub>	$\mathbf{X}_1$	$O_2$	
3.	<b>R</b> 3	$X_2$	<b>O</b> 3	

Informations:

- R<sub>1</sub> :control group
- R<sub>2</sub> : experiment group 1
- R<sub>3</sub> : experiment group 2
- X<sub>1</sub>: treatment using LCD
- X<sub>2</sub> : treatment using NSS
- O<sub>1</sub> : post-test of control group
- $O_2$ : post-test of experiment group 1
- O<sub>3</sub> : post-test of experiment group 2

The population in this study were all students of class X MA Mu'allimin Muhammadiyah Yogyakarta. The sample used in the study was 3 classes which were taken randomly. The three classes have almost the same range of average values. Two classes as the experiment group and one other class as the control group. The sampling technique in this study was determined by using a random sampling technique.

The method of data collection was carried out using tests and questionnaires. Test questions are used for posttests in the control and experiment groups to find out how much students understand the concept of the material that has been studied. The test questions were tested for validity using the Product Moment correlation formula. Test the reliability of the questions using the Kuder-Richardson-20 formula. Ouestionnaires are used to determine students' affective learning outcomes in following the learning process. The questionnaires were tested for content validity and construct validity by consulting with experts.

The normality test of the data was carried out using the Kolmogorov-Smirnov one-sample test, while the homogeneity test was carried out using the Levene test. Hypothesis testing was carried out using the One Way Anova test.

#### **RESULT AND DISCUCCION**

The post-test results data which are the learning outcomes of cognitive aspects are presented in table 2.

Table	2. Cognitive A	Aspect Lea	rning	Outc	omes	Data
No.	Statistics	Contro	Expe	rim	Expe	rim
		1	ent	1	ent	2

		Group	Group	Group
1.	Highest score	84	88	92
2.	Lowest score	36	52	62
3.	Average	61	73	78

From table 2. can be described in the form of a histogram in Figure 1.



Figure 1. Data on Cognitive Learning Outcomes in Experiment Versus Control Groups

In Table 2 and Figure 1 we can see that the cognitive learning outcomes in the experiment group as a whole are higher than the control group, and experiment group 2 is higher than experiment group 1. In Table 3, the percentage of cognitive value categories in each group is presented as follows:

Table 3. Percentage of Cognitive Value Category

	Control and Experiment Group			
Scor	Categor		Percentage (	%)
e	У	Contro	Experiment	Experiment
		1	1	2
20-	Not good	5%	0%	0%
40				
41-	Pretty	40%	3,5%	0%
60	good			
61-	Good	50%	93%	52%
80				
81-	Very	5%	3,5%	48%
100	good			
r	Fotal	100%	100%	100%

The percentage data for cognitive value categories can be described in the form of a histogram in Figure 2:





Figure 2. Percentage of Cognitive Value Category Control and Experiment Group

The data in Table 3 and Figure 2 above show good and very good cognitive aspects of learning outcomes dominated by the experiment group. In the cognitive aspect according to Bloom's taxonomy, there are 6 levels, but in this study, it was limited to the 5th level. The five levels are knowledge, comprehension, application, analysis, and synthesis. The results of obtaining scores for each cognitive level from the post-test results presented in Table 4:

 

 Table 4. Percentage of Cognitive Level of Control and Experiment Group

No.	Level	Control	Exper iment 1	Experi ment 2
1.	knowledge	51,67%	77,98 %	82%
2.	comprehensi on	69,44%	80,16 %	78,67%
3.	application	64%	70%	76%
4.	analysis	45%	45,54 %	67%
5.	Synthesis	90%	92,86 %	100%

The data in Table 4. shows the percentage levels of C1 (knowledge), C2 (comprehension), C3 (application), C4 (analysis), and C5 (synthesis) in the experiment group which is higher than the control group and the experiment group 2 is greater than the experiment group 1. The cognitive level data depicted in Figure



Figure 3. Percentage of Cognitive Level of Control and Experiment Group

Data on the results of filling out the questionnaire which is the result of learning the affective aspect is presented in Table 5.

Table 5. Data on Affective Aspect Learning

		Outc	omes	
No.	Statistics	Control	Experiment	Experiment
		Group	Group 1	Group 2
1.	highest	83	100	100
	score			
2.	lowest	47	55	60
	score			
3.	average	61	73	78

In Table 5 it can be seen that the affective learning outcomes in the experiment group are greater than the control group and experiment group 2 is greater than experiment group 1. The data on affective learning outcomes above can be described in the form of a histogram in Figure 4 below:



Figure 4. Data on Affective Learning Outcomes for Control and Experiment Group

In Table 6, the percentage of affective value categories in each group is presented.

 Table 6. Percentage of Affective Value Category in

 Control and Experiment Group

Score	Category	Percentage (%)		
		Control	Experiment	Experiment
			1	2
20-40	Not	0%	0%	0%
	Good			
41-60	Pretty	50%	14%	4%
	Good			
61-80	Good	45%	68%	68%
81-	Very	5%	18%	28%
100	Good			
]	Fotal	100%	100%	100%

The percentage of affective value category data depicted in the form of a histogram in Figure 5 below:



Figure 5. Percentage of Affective Value Category Control and Experiment Group

The data in Table 6 and Figure 5 above show good and very good affective aspects of learning outcomes dominated by the experiment group. In the affective aspect, there are three affective levels observed in this study, namely receiving, responding, and evaluating. The results of obtaining scores for each affective level from the results of filling out affective questionnaires are presented in Table 7:

Table 7. Percentage of Affective Level of Control

		zxperment	Gloup	
No.	Level	Control	Exper iment 1	Experi ment 2
1.	receiving	59%	74%	78%
2.	responding	62%	74%	76%
3.	valuing	60%	72%	80%

The data in Table 7 shows the average value of the affective level of acceptance (receiving), response (responding), and assessment (valuing) in the experiment group is higher than the control group, and experiment group 2 is greater than the

experiment group 1. Percentage data the affective level is depicted in figure 6:



Figure 8. Percentage of Affective Level Control and Experiment Group

The test used for learning outcomes data on the cognitive aspect is the Median Test and the Mann-Whitney Advanced Test. The data on the results of hypothesis testing can be seen in tables 8 and 9 below:

 Table 8. Median Test Results

 Cognitive Learning Outcomes Data

Data	N Median	Chi- Square	Df	Asymp. Sig.
Post-	73	8,992	2	0,011
test				

Table 9. Mann-Whitney Advanced Test Results	s
Hasil Cognitive Learning Outcomes Data	

I (Group)	J (Group)	Sig.
Control	Experiment 1	0,002
Control	Experiment 2	0,000
Experiment 1	Experiment 2	0,017

The data from the median test results in table 8 shows a significance of 0.011 (p < 0.05), which means that the three samples, namely the control group, experiment 1, and experiment 2 have significant differences in learning outcomes in cognitive aspects. Based on the results of further testing using the Mann-Whitney test, it shows that between the three variables there are significant differences (p < 0.05).

Testing the learning outcomes hypothesis on the affective aspect using the One-way ANOVA test and the Scheffe further test. The results can be seen in tables 10 and 11 below:

Table 10. One-way ANOVA Test Results
Affective Learning Outcome Data

Three Dearning Outcome Data			
Data	N Median	Df	Asymp. Sig.
Affective	73	2	0,000
Learning			
Outcomes			

Table 11. Scheffe Test Results

Affective	Learning Outcome Da	ita
I (Group)	J (Group)	Sig.
Control	Experiment 1	0,000
	Experiment 2	0,000
Experiment 1	Control	0,000
	Experiment 2	0,194
Experiment 2	Control	0,000
	Experiment 1	0,194

The data from the one-way ANOVA test in table 10 shows a significance value of 0.000 (p < 0.05), which means that the three samples, namely the control group, experiment 1, and experiment 2, have significant differences in learning outcomes in affective aspects.

Based on the results of the further test in table 11, it shows that the affective learning outcomes between the control group and experiment group 1 have a significant difference with a significance coefficient of 0.000 (p < 0.05). There is also a significant difference in affective learning outcomes between the control group and experiment group 2 with a significance coefficient of 0.000 (p <0.05). While the learning outcomes affective between experiment group 1 and experiment group 2 there is an insignificant difference with a significance coefficient of 0.194 (p>0.05).

The results of this study reveal that there are differences in the effect of multimedia-based learning using NSS software on learning outcomes in the cognitive and affective aspects of students on environmental pollution material. This is evident from the results of the data analysis of cognitive and affective learning outcomes showing that there is a significant difference between the experiment group and the control group. From the three group samples, there are significant differences in the average cognitive and affective learning outcomes of students, where experiment group 2 using NSS software has the highest average.

Based on the data that has been obtained. multimedia it shows that applications affect students' affective learning outcomes. This is supported by the large percentage of learning outcomes on affective aspects in the experiment groups in this study which includes 3 indicators, namely, indicators of acceptance (receiving), responses (responding), and assessment (valuing). Indicators of acceptance (receiving) are a willingness to accept external stimuli that come to students, either in the form of problems, situations, or symptoms. This type includes awareness, desire to receive a stimulus, control, and selection of symptoms or stimuli from outside.

The data obtained show that the aspect of student acceptance when learning to use the NSS software is greater than the LCD projector. Based on the results obtained from the questionnaire, the average value of the acceptance aspect in the control group was 59%, experiment group 1 was 74%, and experiment group 2 was 78%. This is in line with the observation that in the control group (without multimedia) most of the students did not pay attention to the teacher's instructions and did not make noise, but most of the students slept in class. In experiment group 1, where learning using LCD projectors 3 students were sleeping, and in experiment group 2 where learning using NSS software students were enthusiastic in the learning process and focused on the computer screen in front of them.

indicator of participation The (responding) is the willingness to respond by participating. At this level, students not only pay attention to stimuli but also participate in activities to receive stimuli. Based on the results obtained from the questionnaire, the average value of the response aspects in the control group was 62%, experiment group 1 was 74%, and experiment group 2 was 76%. Aspects of student responses when learning to use the NSS software is greater than the LCD projector. This is in line with the observation that in the control group there is

no indication of student responses. Most of the students did not participate in answering the oral questions given by the teacher. In experiment group 1 where learning using LCD projectors there are 6 active and participating students asking questions if there is a material that is not clear.

Students also participate in answering oral questions given by the teacher. In experiment group 2, where learning using NSS software, it appears that all students participate in working on games and even students compete with each other to be the best. Students also actively participate in asking questions when there is material that is not clear. From these data, it shows that multimedia applications, in this case using NSS software, are considered better by students so that they make students participate in learning activities.

Indicators of assessment or determination of attitudes (valuing) are related to the assessment and belief in symptoms or stimuli. The percentage of student assessment indicators in the experiment group is greater than the control group, this is by the results of observations using affective questionnaires related to student assessments of the learning design applied in their respective classes. Based on the results obtained from the questionnaire, the average value of the assessment aspects in the control group was 60%, experiment group 1 was 72%, and experiment group 2 was 80%. Interest and positive assessment of students towards multimedia applications form an attachment (commitment) so that students are consistent in paying attention to the lesson from beginning to end. This is in line with the results of observations wherein in experiment group 2 where lessons using NSS software all students still pay attention to the computer in front of them from beginning to end. Likewise with experiment group 1 where the lesson uses an LCD projector, but there are still 3 children who in the middle to the end of the lesson do not pay attention to the lesson. While in the control group, most of the students did not pay attention to the lesson from the middle to the end of the lesson.

From these data, it shows that multimedia applications, in this case using NSS software, are considered better by students so that students have a high commitment to taking lessons from beginning to end.

According to Crow & Crow (2012) stimuli that come from the environment or scope that are by one's desires or needs will easily generate interest (Berutu & Tambunan, 2018, p. 112). The results of observations and filling out affective questionnaires showed that students' interest motivation were higher and in the experiment group compared to the control group, with experiment group 2 having the highest interest and motivation. This is because the media used in the form of displaying pictures, videos, and quizzes in the form of games that are displayed make learning more interesting and fun (Purwono, 2014, p. 127). If someone has a high interest in something, he will continue to try to do so that what he wants is achieved (Sawawa, Solehudin, & Sabri, 2018, p. 24).

Some of the functions of learning resources include strengthening learning, improving human abilities in the use of communication various media. and presenting data and information more concretely (Abdullah, 2012, p. 221). Experiment group 1 uses a learning resource in the form of an LCD projector and experiment 2 uses NSS software. Both types of learning resources can help teachers explain biology subject matter more clearly through pictures or videos than the control group which only uses textbooks. Experiment group 2 has better results because it has more varied and interactive media quality.

According to Munir, interactive multimedia applications can facilitate students' understanding of the concept of subject matter (Deliany, Hidayat, & Nurhayati, 2019, p. 93). This statement is by the results of the study, the level of students' understanding as part of the cognitive element was proven to have a good percentage in experiment group 2, which was 78.67%. Even though the 1st experiment group also had a better

percentage of 80.16%, overall the other cognitive levels were greater in the 2nd experiment group which used interactive multimedia NSS.

As stated by Kemp and Dayton, the benefits of using media in learning include making the learning process clearer and more interesting, increasing the quality of student learning outcomes, and fostering positive attitudes of students towards the material and learning process. (Prasetyo, 2007, p. 7). This opinion is proven in this study that the use of multimedia in this case is an LCD projector and NSS software can improve students' cognitive and affective learning outcomes. The use of NSS software has a greater influence on the average value of learning outcomes assumed because the media presented is more interesting, varied, interactive, and focused on students because each student uses one device, not classically as in the use of an LCD projector.

# CONCLUSION

Based on the testing of the research data obtained and their analysis, it can be concluded as follows: 1). Hypothesis testing of cognitive learning outcomes showed that there was a significant effect between the control group, experiment group 1, and experiment group 2. Of the three groups, experiment group 2 had the highest mean value. From these results, it concluded that multimedia-based learning using NSS software has a significant effect on learning cognitive aspects outcomes in of environmental pollution subject matter. 2). The hypothesis test of affective learning outcomes showed that there was a significant effect between the control group, experiment group 1, and experiment group 2. Of the three groups, experiment group 2 had the highest mean value. From these results, it concluded that multimedia-based learning using NSS software has a significant effect on learning outcomes for affective aspects of environmental pollution subject matter.

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