

The Impact of Edmodo assisted by the Virtual Laboratory on Students' Learning Motivation and Independence

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Abstract: One of the difficulties that arise during online learning is the lack of motivation and independence in student learning. Teachers are required to be able to master various kinds of technology in order to be able to apply online learning which can increase motivation and independence. Edmodo is a learning medium that can be used during online learning and provides features that make communication and collaboration between teachers and students easier. The purpose of this study was to determine the impact of the application of Edmodo assisted by a virtual laboratory on students' learning motivation and independence. The design used in this study was a pretest-posttest control group design. The research sample was 60 X MIA students at SMAN 2 Peusangan. The experimental class uses Edmodo assisted by a virtual laboratory combined with PhET simulations, while the control class uses WhatsApp media. The data collection instrument uses a questionnaire on student learning motivation and independence that has been validated by experts. The results of the t-test analysis of learning motivation in the post-test experimental class and control class showed that there were significant differences. While the results of the t-test analysis of learning independence in the post-test experimental class and control class showed that there were also significant differences. The conclusion from the results of this study is that the application of Edmodo assisted by a virtual laboratory has a significant influence on learning motivation and independence, so it is effectively used in learning physics, especially in Newton's Law material.

Keywords: Edmodo; Virtual Laboratory; Motivation; Independence

Introduction

The corona virus pandemic occurred in early 2020 in various regions around the world. During the pandemic the teaching and learning process was moved to the house (Ministry of Education and Culture of the Republic of Indonesia, 2020). Changes in the learning system are a challenge for the world of education to adapt to new habits in the learning process. The teacher has an important role in the effectiveness of the course of learning because the teacher determines the right strategy in learning (Herliana et al., 2020).

Many obstacles occur during distance learning. Obstacles that arise because students and teachers are not used to doing online learning. According to Nadhita et al. (2021) one of the difficulties students experienced

in learning during the covid period was low student motivation. That 60% of students were not motivated to study during the co-19 pandemic (Lubis et al., 2022). In addition to the low level of learning motivation, the level of student learning independence is also low when online learning is carried out. The urgency of problems in online-based learning is one in terms of hindering student learning independence (Lauret et al., 2021).

As a result of the impact of Covid 19, teachers must think hard to overcome the problems and obstacles that occur during online learning. Teachers are required to master various kinds of technology in order to be able to apply distance learning programs (Nur, 2021). There are many media platforms that can be used as learning media which are now widely used by educators and teaching staff, one of which is Edmodo.

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Edmodo is a microblogging platform specifically developed for use by teachers and students in a classroom, aiming to help educators take advantage of social networking facilities according to the learning conditions in the classroom (Basori, 2013). Edmodo learning is a communication and information technology that is useful for facilitating the learning process because it contains various media in the form of images, animated text, and sound which is the beginning of the use of all senses so that students can remember and master their learning material (Nasrullah et al., 2017). Edmodo is very comprehensive as a course management system like Moodle, the difference is that access is faster and easier to use by using several features that function the same as the course management system (Dharmawati, 2017). Edmodo provides a safe and easy way to communicate and collaborate between students and teachers, sharing content in the form of text, images, links, video and audio (Basori, 2013). Edmodo is quite complete as a learning medium with faster access and easier assignments (Ekayati, 2017). The Edmodo application provides the opportunity to create virtual classes that help teachers make connections between theory and practice (Ekici, 2017). In this case, to support online learning through Edmodo media, the use of virtual laboratories can help in terms of practice. Virtual laboratory is an electronic learning process using computer simulation in the form of interactive multimedia-based software. The use of a virtual laboratory will make students feel as if they are in a real laboratory. According to Astiani et al. (2019) The use of virtual laboratories can help increase student motivation. Therefore it is hoped that Edmodo with the help of a virtual laboratory can increase student learning motivation and independence.

Method

Research Design

The type of research used in this research is experimental research. Design This study used the pretest-posttest control group design method. This design has two class groups, namely the first group as an experimental class using the Edmodo media platform and the second group as a control class using WhatsApp media.

Population and Research Sample

The population in this study were all students of class X IPA SMAN 2 Peusangan in the even semester of the 2021/2022 academic year, totaling 150 students divided into 5 classes. While the sampling technique in this study was carried out by random sampling, referring to the test scores of students in odd semesters who have homogeneous abilities. All classes were

randomized and two sample classes were obtained, namely class X MIA 1 as the control class with 30 respondents and Class X MIA 2 as the experimental class with 30 respondents.

Data Collection

The research instrument used to measure learning motivation and independence is a questionnaire. The motivational questionnaire and the independent learning questionnaire were developed by the researcher. The questionnaire used was validated by 2 experts. The motivational questionnaire and the independent learning questionnaire were tested on 30 students of class XI IPA at SMAN 2 Peusangan. Furthermore, the validity was tested using the Pearson correlation formula through the SPSS version 23 application. Of the 30 statement items, 25 statements were valid and 5 were invalid for the motivational questionnaire and also the learning independence questionnaire. To see the reliability of the questionnaire using the Cronbach alpha formula. The results of the reliability test on the motivational questionnaire showed an alpha coefficient of 0.887 and the results of the reliability test for independent learning showed an alpha coefficient of 0.906. This shows that the motivational questionnaire and the learning independence questionnaire can be used.

Data collection uses a motivational questionnaire and a learning independence questionnaire. The questionnaire given the motivational questionnaire and the learning independence questionnaire consisted of 25 statements which were distributed to all samples. A questionnaire was given to determine the effect of Edmodo assisted by a virtual laboratory on learning motivation and independence. Questionnaires were given during the pre-test and post-test to both classes, namely the control class and the experimental class. The scale used in the motivational and independent learning questionnaire is the Likert scale with category 4 with criteria 1 = disagree (TS), 2 = disagree (KS), 3 = agree (S), 4 = strongly agree (SS). Then the results of student answers will be analyzed.

Data Analysis

Data analysis used in this study is to test for normality using the Liliefors test. The normality test has provisions, where a data is said to be normally distributed if $L_{max} > \alpha = 0.05$ and $L_{max} < L_{table}$ and data if $L_{max} > L_{table}$ then the data is not normally distributed. To see whether the research data is homogeneous or not, a homogeneity test is carried out using the F-test. Decision making if $F_{count} \leq F_{table}$ means that both experimental and control class tests have a homogeneous variant. Then just do the hypothesis test using the t-test. Decision making on the t-test is if $t_{count} \geq t_{table}$, then the results are

significantly different. To see the relationship between motivation and learning independence, the Pearson correlation test formula is used. The Pearson correlation test was analyzed with the help of the SPSS version 23 program, at a significant level $\alpha = 0.05$, with the criterion if ($p < 0.05$) then it is correlated.

Table 1. Guilford’s interpretation of the magnitude of significant correlation (Van Aswegen et al., 2009)

Absolute Value of R	Interpretation
< 0.19	Slight
0.20-0.39	Low correlation
0.40-0.69	Moderate correlation
0.70-0.89	high correlation
0.90-1.00	Very high correlation

Result and Discussion

This research looks at how the motivation and independence of student learning using Edmodo is assisted by a virtual laboratory. The virtual laboratory used in this research is PhET Simulation. The results of learning physics using Edmodo assisted by a virtual laboratory can be seen in Figure 1 where students carry out learning activities by working on student worksheets (LKPD) that have been inputted into the class contained in the Edmodo application.



Figure 1. Display of activities on the Edmodo platform

Student practicum activities are carried out using PhET Simulation. The link for PhET Simulation has been shared in the LKPD which was uploaded to the Edmodo class. Figure 2 shows the display of the phet virtual laboratory where students carry out practical activities.

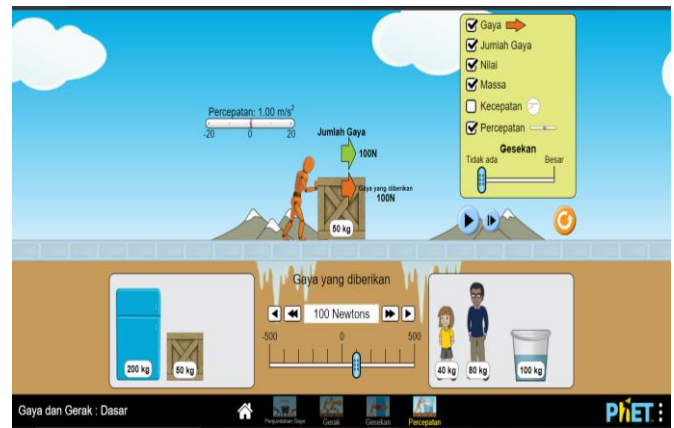


Figure 2. Display of the PhET Simulation Virtual Laboratory

The use of a virtual laboratory aims to help increase student motivation and independence in learning during a pandemic. Virtual laboratories can be a useful tool for individual student training and education and increase the optimization of efficiency where circumstances make it difficult to use a physical laboratory (Oyewola et al., 2021). Virtual laboratories support practicum activities like in real laboratories which are interactive, dynamic, animative so they are not boring and support students in understanding learning (Jaya, 2012). Virtual laboratories are used for learning which makes students experience intellectual challenges in their learning process (Rohim, 2020). As well as the use of virtual laboratories can increase motivation and support students' understanding of scientific physics concepts (Kharki, 2021).

Motivation to Learn

Data on the ability to learn motivation in this study was obtained by giving pre-test and post-test questionnaires to students. For pre-test data obtained from the results of giving a questionnaire before being treated using Edmodo assisted by a virtual laboratory. Data must be normally distributed and homogeneous before conducting the t-test. The following are the pretest results obtained from the experimental class and control class in this study presented in Table 2.

Based on Table 2, the average pretest results for the control class and experimental class were 52.03 and 50.90. The pretest results for the control class were obtained with $L_{count} < L_{table}$ values, namely $0.077 < 1.161$ and for the experimental class, $L_{count} < L_{table}$ values were obtained, namely $0.105 < 1.161$ so that it could be concluded that the data for each class were normally distributed. In the homogeneity test, decision making is also based on the provisions of hypothesis testing. Homogeneity test, namely if $F_{count} < F_{table}$, it is stated that both data in the experimental class and control class have a homogeneous variance. The results of the pre-test statistical analysis between the experimental class and

the control class obtained that $1.17 < 1.84$ so that it can be concluded that each class has a homogeneous

distribution. After the homogeneity test was carried out, the t test was carried out.

Table 2. Pre-test Analysis of Learning Motivation in the Experimental (N=30) and Control Class (N=30)

Class	Average Score	Normality *	Homogeneity **	Significance ***
Experiment	50.90	$L_{count} < L_{table}$ (0.105) < (0.161) "Normal"	$F_{count} < F_{table}$ (1.17) < (1.84)	$T_{count} < t_{table}$ (-1.01) < (1.68)
Control	52.03	$L_{count} < L_{table}$ (0.077) < (0.161) "Normal"	"Homogeneous"	"Not Significantly Different"

Note:

*) = Lilliefors test (normal, value $L_{count} < L_{table}$, $\alpha=0.05$)

**) = F test(Homogeneous, value $F_{count} < F_{table}$, $\alpha=0.05$)

***) = t test (Significance, $t_{count} < t_{table}$, $\alpha=0.05$)

The decision is made based on the provisions of the t-test hypothesis testing, namely if $t_{count} < t_{table}$ then the data is stated to be significantly different, so that H_0 is accepted and H_a is rejected. The results of the t-test in the experimental class and control class pretest obtained $t_{count} < t_{table}$, namely $-1.01 < 1.68$. This proves that the pretest t-test is not significantly different. Based on the pre-test results obtained from the control class and the experimental class before being given treatment, the results showed that there was no significant difference.

Posttest is given by distributing questionnaires to students. The questionnaire was given after being given treatment. The data obtained after being treated using Edmodo assisted by a virtual laboratory were then analyzed. The data was first tested for normality and then tested for homogeneity and then tested for the hypothesis using the t test. The following results of the analysis of the ability of the posttest results of students' learning motivation in the experimental class and the control class can be seen in Table 3.

Table 3. Post-test Analysis of Learning Motivation in the Experimental (N=30) and Control Class (N=30)

Class	Average Score	Normality *	Homogeneity **	Significance ***
Experiment	92.07	$L_{count} < L_{table}$ (0.142) < (0.161) "Normal"	$F_{count} < F_{table}$ (1.84) < (1.84)	$T_{count} > t_{table}$ (11.14) > (1.68)
Control	80.23	$L_{count} < L_{table}$ (0.111) < (0.161) "Normal"	"Homogeneous"	"Significantly Different"

Note:

*) = Lilliefors test (normal, value $L_{count} < L_{table}$, $\alpha=0.05$)

**) = F test(Homogeneous, value $F_{count} < F_{table}$, $\alpha=0.05$)

***) = t test (Significance, $t_{count} < t_{table}$, $\alpha=0.05$)

The results of the normality test were obtained based on Table 3. that the value of $L_{count} < L_{table}$ for the experimental class was $0.142 < 0.161$ and for the control class was $0.120 < 0.161$ so that the data was normally distributed. The homogeneity test obtained was $F_{count} < F_{table}$, namely $1.84 < 1.84$, so it can be concluded that the experimental class and control class data have homogeneous data variances. The results of the analysis on the t test show that $t_{count} > t_{table}$ is $11.4 > 1.68$ so that the conclusion is that the values of the experimental class and the control class are significantly different. Thus the hypothesis put forward is that students' learning motivation differs significantly by applying Edmodo assisted by a virtual laboratory on Newton's law material. The decision is made based on the provisions of the t-test hypothesis testing, namely if $t_{count} < t_{table}$ then the data is stated to be significantly different, so that H_0 is rejected and H_a is accepted.

The average pretest score for the control class was 52.03 and the experimental class was 50.90. While the

average post-test score in the control class was 80.43, it was included in the good category. After being treated by applying Edmodo with the help of a virtual laboratory, the experimental class score increased to 92.07 included in the very good category. And the results of the analysis on the t test, it is known that $t_{count} > t_{table}$ is $11.4 > 1.68$ so that the conclusion is that the values of the experimental class and the control class are significantly different. The use of the Edmodo learning application has a significant or positive effect on student learning motivation (Vania et al., 2018; Hikmawan et al., 2018; Kamal et al., 2021). The online activities contained in Edmodo help motivate students in learning the subjects being taught (Hoesny et al., 2020). By increasing student motivation in learning, it will have an impact on increasing student learning outcomes as well (Wajdi et al., 2021). The use of Edmodo is able to motivate students to become independent learners with the help of authentic materials uploaded by teachers (Agustiani et al., 2021). As well as Edmodo is also able to help teachers

to make content understandable, check student understanding, obtain student responses, and encourage communication between students (Fauzi, 2017). Then Edmodo can support the learning process online (Sudibjo & Wasis, 2013).

Learning Independence

In this study, the student learning independence questionnaire was measured for each indicator, both in

the experimental class and the control class. The questionnaire contains 25 statements. Data must be normally distributed and homogeneous before the t test is carried out. The results obtained from the calculation of normality, homogeneity and t-test for the experimental class and control class pretest value data are presented in Table 4.

Table 4. Pre-test Analysis of Learning Independence in the Experimental (N = 30) and Control Class (N = 30)

Class	Average Score	Normality *	Homogeneity **	Significance ***
Experiment	51.40	$L_{count} < L_{table}$ (0.109) < (0.161) "Normal"	$F_{count} < F_{table}$ (1.47) < (1.84)	$t_{count} < t_{table}$ (0.64) < (1.68)
Control	50.60	$L_{count} < L_{table}$ (0.077) < (0.161) "Normal"	"Homogeneous"	"Not Significantly Different"

Note:

- *) = Lilliefors test (normal, value $L_{count} < L_{table}$, $\alpha=0.05$)
- **) = F test(Homogeneous, value $F_{count} < F_{table}$, $\alpha=0.05$)
- ***) = t test (Significance, $t_{count} < t_{table}$, $\alpha=0.05$)

Based on Table 4, the average pretest results for the experimental class and the control class were not significantly different, namely 51.40 and 50.60. The experimental class pretest results obtained $L_{count} < L_{table}$ values, namely $0.109 < 1.161$ and the control class obtained $L_{count} < L_{table}$ values, namely $0.077 < 1.161$ so it can be concluded that the data for each class is normally distributed. In the homogeneity test, decision making is also based on the provisions of hypothesis testing. The pre-test homogeneity test between the experimental class and the control class obtained that $1.47 < 1.84$ so it can be concluded that each class has a homogeneous distribution. The decision is made based on the provisions of the t-test hypothesis testing, namely if $t_{count} < t_{table}$ then the data is stated to be significantly different, so that H_0 is accepted and H_a is rejected. The results of the t-test in the experimental class and control class pretest obtained $t_{count} < t_{table}$, which is $0.64 < 1.68$. This proves that the pretest t-test is not significantly different, thus it can be concluded that students in the

experimental class and control class have the same pretest, meaning that there is no significant difference between the experimental class and the control class. Analysis of students' learning independence posttest ability in the experimental class and control class after being treated can be seen in Table 5.

Based on Table 5, the average post-test results for the experimental class and the control class were not significantly different, namely 91.77 and 80.53. The experimental class pretest results obtained $L_{count} < L_{table}$ values, namely $0.119 < 1.161$ and the control class obtained $L_{count} < L_{table}$ values, namely $0.113 < 1.161$ so that it can be concluded that the data for each class is normally distributed. In the homogeneity test, decision making is also based on the provisions of hypothesis testing. The post-test homogeneity test between the experimental class and the control class obtained that $1.16 < 1.84$ so it can be concluded that each class has a homogeneous distribution.

Table 5. Post-test Analysis of Learning Independence in the Experimental (N = 30) and Control Class (N = 30)

Class	Average Score	Normality *	Homogeneity **	Significance ***
Experiment	91.77	$L_{count} < L_{table}$ (0.119) < (0.161) "Normal"	$F_{count} < F_{table}$ (1.16) < (1.84)	$t_{count} > t_{table}$ (14.97) > (1.68)
Control	80.43	$L_{count} < L_{table}$ (0.117) < (0.161) "Normal"	"Homogeneous"	"Significantly Different"

Note:

- *) = Lilliefors test (normal, value $L_{count} < L_{table}$, $\alpha=0.05$)
- **) = F test(Homogeneous, value $F_{count} < F_{table}$, $\alpha=0.05$)
- ***) = t test (Significance, $t_{count} < t_{table}$, $\alpha=0.05$)

The results of the analysis on the t test show that $t_{count} > t_{table}$ is $14.97 > 1.68$. Thus the hypothesis put forward is that students' scientific attitudes differ

significantly by applying Edmodo assisted by a virtual laboratory on Newton's law material. The decision is made based on the provisions of the t-test hypothesis

testing, that is, if $t_{count} < t_{table}$ then it is stated that the data is significantly different, so that H_0 is rejected and H_a is accepted.

The average pretest and protest scores obtained in the control and experimental classes. The average pretest score of the control class was 50.06 and the experimental class was 51.40. While the average post-test score in the control class was 80.43 which was included in the good category. After being treated by applying Edmodo assisted by a virtual laboratory, the experimental class score increased to 91.77 which was included in the very good category. And the results of the analysis on the t test show that $t_{count} > t_{table}$ is $14.97 > 1.68$, so that the conclusion of the scores of the experimental class and the control class is significantly different. Thus the contribution of the application of Edmodo assisted by a virtual laboratory can increase student learning independence. There is an impact on learning independence after using Edmodo (Satriani et al., 2020; Khairini et al., 2021).

Independent learning makes learning centered on the creation of students from important opportunities and experiences for these students so that they are able, confident, self-motivated and able to learn at any time. With independent learning, students will be able to develop values, attitudes, knowledge and skills (Suciati, 2016). One of the purposes of using Edmodo is to change passive student learning to an active learning culture so that learning independence is formed (Ompusunggu et al., 2019, Sumardi et al., 2020). So it is in accordance with what was found in this study where Edmodo with the help of a virtual laboratory was able to increase learning independence.

Analysis of the Relationship Between Motivation and Learning Independence

The relationship between motivation and student learning independence was analyzed using the Pearson correlation test, as additional information in this study. This is done to see the relationship between motivation and independence. The results of the correlation test are presented in table 6.

Table 6. Correlation of Motivation with Student Learning Independence

Variabel	Pearson Correlation*)	Significance **)
Motivasi with Independent learning participants	0.706	(0.00 < 0.05) ha received

Note:

*) = Pearson Correlation (medium)

**) = Pearson (ha received, Sig < 0.05)

Table 6 shows the significance obtained by 0.00 < 0.05 means that there is a relationship between motivation and student learning independence. The level of the relationship between motivation and student learning independence obtained a Pearson correlation of 0.706 which is classified as a high correlation criterion. This means that there is a significant relationship between the variables of motivation and learning independence. And the correlation results are positive, namely 0.706, so the correlation of the two variables is unidirectional. If the value of motivation is high, the value of learning independence will also be high. there is a relationship between motivation and student learning independence where the higher the motivation the higher the learning independence (Batubara et al., 2021). Fitriani et al. (2020) also found that there is a significant relationship between motivation and learning independence. Based on indicators of learning motivation, Sudibjo et al. (2016) and indicators of learning independence Sanjayanti et al. (2015) that there are indicators that are the same between motivation and independence, namely the indicator of self-confidence. Therefore, in theory, there is a relationship between learning motivation and learning independence.

Student Response to Edmodo is Assisted by a Virtual Laboratory

Student responses to Edmodo assisted by the virtual laboratory used are contained in 15 questions. These questions include ease of understanding, interest in learning, student motivation and independence. Based on the results of the study, the overall average value of the student response percentage was 90%. This shows that the response of students to learning using Edmodo assisted by a virtual laboratory is very good. Student responses after using Edmodo learning media were in the high category (Aulia et al., 2019). The use of Edmodo in learning is a new thing for students so that it can increase student learning motivation and independence. Edmodo can be an alternative that teachers can use in implementing learning. this is supported by Basori (2013) which states that Edmodo is very supportive for learning activities. Edmodo also supports teaching and face-to-face interactions between students and teachers, provides students with many references available online, and is easy to use in discussions (Hoesny et al., 2020). Edmodo also helps teachers to communicate with students, learn students' thoughts, opinions and expectations about class, provides opportunities for students to be involved in the decision-making process on assignments given by teachers which increases student independence, and is able to express their opinions in online classes (Eguz, 2020). Edmodo makes students minimize the anxiety

they feel during face-to-face learning so that students are more actively involved in learning (Sumardi et al., 2020).

Conclusion

Based on the results of the study it can be concluded that the application of Edmodo assisted by a virtual laboratory has a significant effect on learning motivation and student learning independence in Newton's law material. Furthermore, there is a relationship between motivation and learning independence. As well as students' responses to the application of Edmodo assisted by virtual laboratories getting very good responses from students.

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