The Effectiveness of Online Learning Assisted by Google Classroom on Students' Learning Outcomes about Energy

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Abstract

The study aims to determine the effectiveness of google classroom in online learning towards students’ learning outcomes on Energy topic at SMAN 1 Nanga Mahap. The design of this study was pre-experimental with one group pre-test post-test design. The data collection technique used was assessment, which were carried out by collecting test results before and after treatment. Data analysis was carried out using the g factor formula (N-gain), recapitulation percentage, and effect size. The results showed that: (1) Students' learning outcomes were in the medium category, showed by the N-gain value obtained 0.40142. Learning outcomes increased by 8.625, from 71.625 (pre-test) to 80.25 (post-test). (2) The percentage of students’ learning outcomes increased by 8% from 72% (high category) to 80% (high category) after treatment. (3) The use of google classroom in online learning effectively improves students’ learning outcomes at SMAN 1 Nanga Mahap. The standard deviation was 18.31, and the effect size (ES) value was 0.470 in the medium category. Based on the results, it is hoped that schools and teachers can consider it in choosing effective online learning media to improve students’ learning outcomes.

Keywords: Energy, Google Classroom, Learning Outcomes, Online Learning, Pre-Experimental

INTRODUCTION

Physics is a science that studies nature by observing natural facts and events to produce physical concepts to explain these facts and events. Natural phenomena studied in physics are complex phenomena that require accurate concepts, facts, and physical theories to explain the process of occurrence of these events or phenomena. Liliasari and Tawil (2015) argued that physics is not only about formulas, numbers, and operations but also studying ideas and structures between them. Physics deals with abstract concepts and requires high mental activity to understand the meaning. Therefore, learning physics is essentially an advanced mental activity that understands the meaning of structures, relationships, and symbols then apply the resulting concepts into everyday life to cause behavioral changes, which is one indicator of success in learning so that the objectives of learning physics that have been determined can be achieved through successful learning.

Hamalik defines learning outcomes as changes in student behavior that can be observed and
measured from the aspect of knowledge, attitudes, and skills owned by each student (in Sutrisno, 2020). Abdul and Jihad (2012) state that learning outcomes are a form of behavioral change that tends to settle from the cognitive, affective, and psychomotor domains of the learning process carried out within a certain time. So that success in a lesson can be seen from student behavior changes based on aspects owned by the students themselves.

Permendiknas No. 22 (2006) set the goal of learning physics to develop high reasoning abilities to explain natural events and solve problems qualitatively and quantitatively with the concepts and principles of physics to foster the ability to reason inductively, analyze and think deductively. Physics learning in schools functions to master the concepts and principles of physics and have skills for developing knowledge and self-confidence as a condition for continuing education to a higher level and the development of science and technology (Depdiknas, 2006). In its implementation in the field, students often feel less confident about their skills and abilities, so innovations in learning methods are needed to improve the function of physics learning in schools.

Munir revealed that learning is a process that opens up knowledge and an active process of seeking and forming knowledge (Munir, 2009). Supardi (2013) stated that effective learning is a structured blend of humans, materials, facilities, equipment, and procedures that aim to change students' attitudes in a positive and better direction based on the set learning objectives.

Hamalik suggested that effective learning provides opportunities for students to learn independently and carry out learning activities as widely as possible for students to seek and develop their knowledge (Hamalik, 2001). Slavin suggested that the effectiveness of learning can be measured using four indicators: (1) Quality of learning, namely how high the level of quality of information or material is presented, (2) Conformity of the level of learning, namely the extent to which the teacher ensures the level of readiness of students in receiving new material, (3) Incentives are how much effort the teacher makes to motivate students to complete assignments and learn the material provided, (4) Time is the time required by students to complete learning activities (Slavin, 2000).

Viridi revealed that currently, teacher-centered learning is no longer effective because of the rapid development of Science and Technology so that innovation and change are needed to a more student-centered approach that has diverse abilities in using technology (Viridi, 2017). In this case, teachers must have the skills and abilities to think creatively and innovatively in utilizing technology in learning. So that teachers can work with students in using and applying technology as a means to achieve learning goals.

Online learning is a program or learning method that focuses on pedagogy/double reading, technology, and the design of an effectively integrated learning system. Caliskan, Suzek & Ozcan (2017) stated that online learning benefits students to get the information needed easily and flexibly without the limitations of time and place. Nizetha Daniel et al. revealed that until now, the global world requires students to use technology-based learning to obtain more information in every learning process (Nizetha Daniel et al., 2017). Ferrer & Kirschning (2014) also stated that through online learning applications, significant progress will be achieved in developing digital content that is more accessible and understandable by learners, including online learning collaborations, instant messaging, and users of other information exchange applications or chatting. WhatsApp, Telegram, Line, email or social networks (Facebook, Twitter, Instagram) to ensure education can be accessed anytime, anywhere. Therefore, the gateway to information no longer requires a physical presence, but can be solved by going through searching and using online-based learning.

Mayasari revealed that google classroom or virtual classroom is an educational-scale blended learning platform that makes it easy for teachers to create, share, and categorize paperless assignments (Mayasari, 2019). According to Google's official website, the Google Classroom app is a free productivity tool that includes email, documents, and storage connected via an internet connection. Google Classroom is designed to make it easier for teachers to save time, manage classes, and improve communication with students. Ifatkar (2016) states that there are several features that teachers can use in Google Classroom, namely assignments, grading, communication, time-cost, archive course, mobile application, and privacy.

Google classroom has the advantages of being easy to use, timesaving, cloud-based, flexible, and free. It is a consideration that Google classroom suitable for use in learning, especially online
learning. Hardiyana revealed that the use of google classroom makes it easier for educators to learn and communicate information precisely and accurately to students (Hardiyana, 2015). This goes according to purpose if students respond positively to the learning method used.

A study conducted by Ahmad, Firdausi & Makky (2020) regarding "Effectiveness of Online Learning by Using Google Classroom in Mathematics at Madrasah Aliyah Darul Fatah Batu Jangkih" stated that google classroom is effectively used in online learning. In Aflandi, Widyawati & Bhakti’s (2020) research on "Analysis of the Effectiveness of E-Learning Media in Improving Learning Outcomes of High School Students in Physics Lessons," also stated that the Google Classroom e-learning learning media is very effective in improving students’ learning outcomes.

SMAN 1 Nanga Mahap is one of the schools that has implemented online learning. Based on field observations, learning activities at the school have not used e-learning media optimally because supporting devices constrain online. From the learning process, students are given assignments by the teacher, who must be taken to school and collect the assignment results back to school again after taking the next assignment. The same thing is also done for learning materials summarized in a module containing material for one semester and then given to students to be studied at home. It makes it difficult for students and teachers to manage classes, give assignments and communicate learning, so there is a need for innovation to take advantage of learning media that easily accessible to improve students’ learning outcomes.

This study is a development of previous research that combines online learning using google classroom on students’ learning outcomes about Energy. The purpose of this study is to determine whether the use of google classroom in online learning is effective on students’ learning outcomes about Energy at SMAN 1 Nanga Mahap. So that this study is expected to provide benefits; namely, it can be a reference for schools, teachers, and students in using Google Classroom in online learning.

METHOD

This type of research was an experimental study in the form of a pre-experimental design with a one-group pre-test post-test design. The treatment of online learning using google classroom for tenth grade students in SMAN 1 Nanga Mahap. After online learning (treatment) was carried out, tests were administered to the students. From the test results obtained, a comparison of the student's scores before and after using Google Classroom in online learning is carried out.

The population in this study were tenth grade students of SMAN 1 Nanga Mahap, namely tenth grade of Science III. The research sample was selected using a purposive sampling technique based on the advice of a physics teacher at SMAN 1 Nanga Mahap. The group selected was tenth grade of Science III, totaling 24 students.

The data collection technique in this study is a assessment technique carried out by collecting test data (pre-test and post-test). The data collection tool is in the form of a learning outcome test in an essay by writing the completion steps. The data were analyzed descriptively by using Microsoft Excel software. Data analysis was carried out based on the formulation of the research problem. The following is the analysis of the data used, namely:

(1) Analysis with the gain formula based on the g factor formula (N-gain) according to Meltzer (2000) as follows:

\[ N - Gain = \frac{S_{post} - S_{pre}}{S_{max} - S_{pre}} \]

(Maharani, 2018)

Information:

\(<g>\) = N-gain normalized

\(S_{post}\) = Post-test Score

\(S_{pre}\) = Pre-test Score

\(S_{max}\) = Maximum Score
For the percentage of learning outcomes analyzed using the following formula:

\[
\text{Percentage} = \frac{\text{Score obtained}}{\text{Maximum score}} \times 100\%
\]

Meanwhile, to find out the average percentage of students’ learning outcomes, calculations are carried out using the following formula:

\[
\text{Average} = \frac{\text{Total score pre/post}}{\text{Number of students}} \times 100\%
\]

Then analyze the effectiveness using Effect Size from Glass as follows:

\[
ES = \frac{\bar{Y}_E - \bar{Y}_C}{S_C}
\]

(Sutrisno, 2011)

Information:

\( ES \) = Effect Size  
\( \bar{Y}_E \) = post-test mean score  
\( \bar{Y}_C \) = mean value of pre-test  
\( S_C \) = standard deviation of pre-test

RESULTS AND DISCUSSIONS

Results

This study was carried out for three weeks at SMAN 1 Nanga Mahap, Sekadau Regency, allocating time for pre-test (90 minutes), treatment (90 minutes), and post-test (90 minutes). Pre-test was administered on April 8, 2021. This pre-test was conducted to see the effectiveness of learning before using google classroom. Treatment was held on April 15, 2021. On April 21, 2021, a post-test had administered. This final test aimed to investigate the effectiveness of learning after using google classroom.

Based on the pre-test and post-test results, data on students’ learning outcomes before and after using google classroom were obtained. Furthermore, data analysis was carried out using N-gain to determine the average value of students’ learning outcomes in online learning using google classroom presented in Table 1.

<table>
<thead>
<tr>
<th>No</th>
<th>Students Code</th>
<th>Pre-Test Score</th>
<th>Post-Test Score</th>
<th>(&lt;g&gt;)</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A1</td>
<td>95</td>
<td>96</td>
<td>0.333333</td>
<td>Medium</td>
</tr>
<tr>
<td>2</td>
<td>A2</td>
<td>80</td>
<td>85</td>
<td>0.277778</td>
<td>Low</td>
</tr>
<tr>
<td>3</td>
<td>A3</td>
<td>85</td>
<td>93</td>
<td>0.615385</td>
<td>Medium</td>
</tr>
<tr>
<td>4</td>
<td>A4</td>
<td>81</td>
<td>83</td>
<td>0.117647</td>
<td>Low</td>
</tr>
<tr>
<td>5</td>
<td>A5</td>
<td>82</td>
<td>94</td>
<td>0.75</td>
<td>High</td>
</tr>
<tr>
<td>6</td>
<td>A6</td>
<td>86</td>
<td>98</td>
<td>1</td>
<td>High</td>
</tr>
<tr>
<td>7</td>
<td>A7</td>
<td>80</td>
<td>88</td>
<td>0.444444</td>
<td>Medium</td>
</tr>
<tr>
<td>8</td>
<td>A8</td>
<td>79</td>
<td>85</td>
<td>0.315789</td>
<td>Medium</td>
</tr>
<tr>
<td>9</td>
<td>A9</td>
<td>36</td>
<td>43</td>
<td>0.112903</td>
<td>Low</td>
</tr>
</tbody>
</table>
Table 1 presents data on the analysis of students’ learning outcomes before and after using Google Classroom using N-gain through the g factor formula from Glass. Based on Table 1, nine students are included in the low category with an average N-gain value of 0.196. Twelve students are included in the medium category with an average N-gain value of 0.426, and 3 students in the high category with an average N-gain value of 0.916. Based on the value (N-gain), the average student learning outcome is 0.40142, which is included in the medium category.

After obtaining the average students’ learning outcomes, the next step was to calculate a percentage to see an increase in participant learning outcomes before and after using Google Classroom presented in Table 2.

<table>
<thead>
<tr>
<th>No</th>
<th>Participant Code</th>
<th>Number of Students</th>
<th>Score Range</th>
<th>Percentage</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A1, A3, A4, A5, A6, A10, A15, A16, A17, A24</td>
<td>10</td>
<td>81-100</td>
<td>41.67%</td>
<td>Very High</td>
</tr>
<tr>
<td>2</td>
<td>A2, A7, A8, A11, A13, A18, A19, A21, A23</td>
<td>9</td>
<td>61-80</td>
<td>38%</td>
<td>High</td>
</tr>
<tr>
<td>3</td>
<td>A12</td>
<td>1</td>
<td>41-60</td>
<td>4%</td>
<td>Medium</td>
</tr>
<tr>
<td>4</td>
<td>A9, A14, A20, A22</td>
<td>4</td>
<td>21-40</td>
<td>17%</td>
<td>Low</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>0</td>
<td>20</td>
<td>0%</td>
<td>Very Low</td>
</tr>
</tbody>
</table>

Average Learning Outcomes: 71,625 72% High

Based on Table 2, there are 41.67% of students in the very high category, 38% of students in the high category, 4% of students in the medium category, and 17% of students in the low category. So that
the average is obtained, the percentage of students’ learning outcomes before using google classroom of 72% is included in the high category.

Table 3. Percentage of students' learning outcomes after using google classroom.

<table>
<thead>
<tr>
<th>No</th>
<th>Participant Code</th>
<th>Number of Students</th>
<th>Score Range</th>
<th>Percentage</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A1, A2, A3, A4, A5, A6, A7, A8, A10, A15, A16, A17, A18, A24</td>
<td>14</td>
<td>81-100</td>
<td>58%</td>
<td>Very High</td>
</tr>
<tr>
<td>2</td>
<td>A11, A13, A19, A20, A21, A23</td>
<td>6</td>
<td>61-80</td>
<td>25%</td>
<td>High</td>
</tr>
<tr>
<td>3</td>
<td>A9, A12, A14, A22</td>
<td>4</td>
<td>41-60</td>
<td>17%</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

Based on Table 3, there are 58% of students in the very high category, 25% of students in the high category, and 17% of students in the medium category. So that the average percentage of students’ learning outcomes before using google classroom is 80%, including in the high category. Further data analysis uses Effect Size from Glass which aims to determine the effectiveness of Google Classroom in online learning on students’ learning outcomes in Energy.

Table 4. Effect Size (ES) calculation results

<table>
<thead>
<tr>
<th>No</th>
<th>Student Code</th>
<th>Pre-Test Score</th>
<th>Post-Test Score</th>
<th>Score (Post-Test) – Score (Pre-Test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A1</td>
<td>95</td>
<td>96</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>A2</td>
<td>80</td>
<td>85</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>A3</td>
<td>85</td>
<td>93</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>A4</td>
<td>81</td>
<td>83</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>A5</td>
<td>82</td>
<td>94</td>
<td>12</td>
</tr>
<tr>
<td>6</td>
<td>A6</td>
<td>86</td>
<td>98</td>
<td>12</td>
</tr>
<tr>
<td>7</td>
<td>A7</td>
<td>80</td>
<td>88</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>A8</td>
<td>79</td>
<td>85</td>
<td>6</td>
</tr>
<tr>
<td>9</td>
<td>A9</td>
<td>36</td>
<td>43</td>
<td>7</td>
</tr>
<tr>
<td>10</td>
<td>A10</td>
<td>81</td>
<td>89</td>
<td>8</td>
</tr>
<tr>
<td>11</td>
<td>A11</td>
<td>72</td>
<td>77</td>
<td>5</td>
</tr>
<tr>
<td>12</td>
<td>A12</td>
<td>45</td>
<td>60</td>
<td>15</td>
</tr>
<tr>
<td>13</td>
<td>A13</td>
<td>69</td>
<td>75</td>
<td>6</td>
</tr>
</tbody>
</table>
From Table 4, which presents the results of the Effect Size calculation, a standard deviation of 18.315 is obtained, and the level of effectiveness of using Google Classroom is seen from the learning outcomes, which is 0.470, which is included in the medium category. So that google classroom is effectively used in online learning to improve students’ learning outcomes.

**Discussion**

This research was conducted online using Google Classroom. Before treatment, a post-test was administered to see the initial abilities of students. After that, treatment was carried out in the form of learning using google classroom media which was carried out online at their respective places. The learning carried out in the treatment is the provision of learning materials about Energy in the form of modules along with video links explaining the material. Then the final stage is a post-test to see the final ability of students after treatment. All learning activities starting from assignments, giving materials, and collecting assignments are carried out through Google Classroom.

This study reviewed three aspects: to determine students’ learning outcomes, the percentage of learning outcomes, and the effectiveness of using google classroom in online learning on Energy. The use of google classroom in this study replaces the face-to-face learning method in the classroom with virtual classes in their respective places. So that activities starting from the initial test, treatment, and final test are carried out through Google Classroom. There are aspects contained in google classroom, namely: deadline for submission of assignments and test instructions.

Based on the results of data analysis in online learning using google classroom on Energy, it was found that students’ learning outcomes have increased as evidenced by the value (N-gain) of 0.40142, which is included in the medium category. The increase in students’ learning outcomes occurred because of communication in the form of questions and answers between students and researchers when treatment is carried out in google classroom. In addition, the treatment in Google Classroom was providing material in the form of a video to explain the topic. The increment was in line with Maryam (2021), which found out that learning with the e-learning method using google classroom in physics lessons can improve students’ learning outcomes with N-gain in the medium category.

Furthermore, from the increase in students’ learning outcomes and then calculated in the form of percentages, it was found that the percentage increase in students’ learning outcomes was 8% from the pre-test time of 72% to 80% during the post-test, which was included in the high category. So that the use of google classroom in online learning on Energy has a high percentage of 8%, the increase in learning outcomes in this study was in accordance with the findings of Su'uga (2020) in
his research, stating that e-learning media based on google classroom can increase students’ learning outcomes by 12-19 from the results of the average grade 63 increasing to 81.8.

The percentage increase in the average learning outcomes of students in this study was 8%. The percentage of learning outcomes increased after treatment, where students had studied and understood the learning material. There was communication between students and teachers through google classroom in the learning provided.

After obtaining the average percentage of students’ learning outcomes, an analysis of the effectiveness of the use of Google Classroom in online learning was carried out from students' learning outcomes. The effectiveness of using google classroom in online learning was calculated using the Effect Size formula from Glass. The ES value was 0.470 and was based on the criteria for the magnitude of the effectiveness. The ES value was included in the medium category. So based on the ES value obtained, the use of google classroom in online learning was effectively used to improve students’ learning outcomes on Energy. The findings in this study were in accordance with the results of research by Vivi and Jun (2021), which stated that google classroom is effectively used in learning, as evidenced by hypothesis testing. The effect of the effectiveness of using google classroom on learning outcomes was significant. In this study, the effectiveness of using Google Classroom in online learning on learning outcomes was proven by the Effect Size value of 0.470, which is included in the medium category.

CONCLUSIONS AND SUGGESTIONS

Conclusions

Based on the findings and discussion in this study, it can be concluded that there is an influence on students’ learning outcomes before and after utilizing google classroom in online learning about Energy. The use of google classroom in online learning can improve students’ learning outcomes by 8.625 from 71.625 before treatment to 80.25 after treatment. The increment in the average percentage of students’ learning outcomes by 8% is included in the high category from the average score 72% (high category) increasing to 80% (high category). In comparison, the effectiveness of using google classroom in online learning was 0.470, which is included in the medium category based on the effect size criteria. So that google classroom is effectively used in online learning to improve students’ learning outcomes on Energy.

Suggestions

The results of this study can be used as a reference for schools, teachers, and other researchers in considering the use of google classroom learning media as a virtual classroom media that supports online learning to improve students’ learning outcomes. Teachers are expected to innovate in using google classroom as a learning media so that learning objectives can be achieved for further researchers to develop this research by combining learning methods that can improve students’ learning outcomes optimally.

REFERENCES


