



## Google Classroom-based Online Learning Study Outcomes on Reproductive Concept in Science Classes

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### ABSTRACT

**Background:** This research shows the improvement of student learning outcomes with Google Classroom-based learning on the concept of human reproductive systems in science classes. **Methods:** The research method used is the pre-experimental method one-group pretest-posttest design. Samples were taken in non-probability sampling with purposive sampling, which is a science class of 38 students. The treatment given in this study is learning done online using google classroom application, all activities in google classroom on the concept of the human reproductive system. **Results:** The results of the analysis showed with t calculate (-15.39) greater than t table (-2.04). Based on data analysis and testing, it can be interpreted that there is an increase in student learning outcomes with google classroom-based online learning. The increase is seen from the N-gain value (0.57), which interprets learning outcomes in medium theories. **Conclusions:** Effectivity learning activities need to be presented by teachers in the face of pandemic situations, although they cannot be done for luring. Google Classroom based online learning can package distance learning more effectively, which has an impact on improving student learning outcomes.

### Pembelajaran Daring berbasis *Google Classroom* terhadap Hasil Belajar Konsep Reproduksi pada Kelas Sains

### ABSTRAK

**Background:** Penelitian ini menunjukkan peningkatan hasil belajar peserta didik dengan pembelajaran berbasis *Google Classroom* pada konsep sistem manusia di kelas sains. **Metode:** Metode *pre-eksperimen* digunakan dengan menggunakan desain *one-group pre-test post-test*. Sampel diambil secara *non-probability sampling* dengan *purposive sampling* yaitu kelas sains sebanyak 38 peserta didik. Perlakuan yang diberikan pada penelitian ini adalah pembelajaran yang dilakukan secara daring menggunakan *google classroom*, semua kegiatan dalam pembelajaran dilakukan dalam *google classroom* secara *online* pada konsep sistem reproduksi manusia. **Hasil:** Hasil analisis menunjukkan dengan t hitung (-15,39) lebih besar dari t tabel (-2,04). Berdasarkan analisis data dan pengujian dapat diinterpretasikan bahwa ada peningkatan hasil belajar peserta didik dengan pembelajaran daring berbasis *google classroom*. Peningkatan tersebut dilihat dari nilai N-gain sebesar (0,57) yang menginterpretasikan pada peningkatan hasil belajar dalam kategori sedang. **Kesimpulan:** Kegiatan pembelajaran yang efektif perlu dihadirkan guru dalam menghadapi situasi pandemi, meskipun tidak dapat dilakukan secara tatap muka. Pembelajaran daring berbasis *google classroom* dapat mengemas pembelajaran jarak jauh lebih efektif yang berimbas pada peningkatan hasil belajar peserta didik.

### Kata kunci:

*Google Classroom*  
Hasil Belajar  
Pembelajaran Daring



## Introduction

The third millennium began a chapter called Industrial Revolution 4.0 (Armada, 2019). In line with empirical evidence in the form of demands in this round is very complex. The use of technology must be applied to study. Science and technology is an important aspect to realize Education in the 21st century (Dwiyugo, 2018).

As a result of the COVID-19 pandemic, one of the crucial sectors affected is the education sector. Education becomes a donor sector to create superior Indonesian human resources. The Minister of Education and Culture of the Republic of Indonesia made a policy to regulate learning mechanisms during the Covid-19 pandemic to be carried out at home (Menteri Pendidikan dan Kebudayaan Republik Indonesia, 2020)

A vital component that education practitioners in learning often highlights can help teachers continue learning at home. An alternative form of learning suitable for dealing with pandemics is online learning. Based on observations of the students of the flagship school in Tasikmalaya held in November 2019, online learning conducted at home has not comprehensively realized exciting learning. The problem is that teachers have not been able to integrate the LMS (Learning Management System), and the learning implemented has become less effective.

The lack of effectiveness of learning that makes the students' understanding score under the Minimum Completeness Criteria (KKM), according to the results of interviews of biology teachers in the class, is generally the score of students in the cognitive sphere of 74 while the predetermined KKM is 76 for Biology subjects. Another concern is if students learn from sources that are not credible for some crucial material that teachers must deliver educationally such as human reproductive system material. The material of the human reproductive system is attached to the life of adolescents until it is important to be conveyed in a straightforward and educational way so as not to cause ambiguity.

In fact, online learning is distance for study online combined with technology, (Bonk & Zhang, 2006). Google Classroom is an application that can increase the understanding of students, used by teachers and students with access through the internet, (Bunyamin et al., 2019).

Google classroom features that support the online learning process, namely discussion forums, learning resources, quizzes, assignments, academic information, and management of students data related to the assessment of students learning outcomes. This feature can facilitate the implementation of online learning to run effectively (Triyanto et al., 2016).

Online learning has been studied by many researchers before. Online learning is effectively used in the Topic of

Bahasa Indonesia learning. The increase in student absorption in materials reached more than 81% in online learning than face-to-face learning (Kuntarto, 2017). Quimper type LMS achieved an increase in learning outcomes in experimental classes by 28.13% (Adiratna, 2018). Also, LMS Edmodo has a positive activity of 61.16% of students in learning (Triyanto et al., 2016).

Learning research with google classroom media has also been done, but previous research has been more dominant in exposing online learning beyond learning conducted in pandemic situations. The learning was carried out using online discussion learning methods through Google Classroom with a post-test and pre-test score range of 19.25 (Bunyamin et al., 2019).

Another study with google classroom stated that google classrooms affect students' motivation and learning outcomes in biology learning in grade XI Sains Senior High School with an N-gain of 0.612 (Zaputra & Sulastri, 2020). Even research on biology education students with google classroom can increase the understanding of learning materials by 60.42 and the effectiveness of google classroom application usage by 46.74% (Suhada, 2020).

Few teachers have not been able to package learning with technology to provide effective learning remotely without face-to-face meetings. There is not much research in Indonesia that presents online learning with 100% intensity; many types of research are available, usually on blended learning. Practical learning activities need to be presented by teachers in any situation. Providing learning during pandemic situations is a new challenge for Indonesian educators. Maintaining the enthusiasm and understanding of students towards a concept can be built with a learning atmosphere that is not monotonous even though it cannot be done face-to-face. Google Classroom-based online learning can package distance learning more effectively, which impacts students' learning outcomes.

This study was conducted to determine the effectiveness of students learning outcomes with google classroom-based online learning on the concept of reproductive systems in science classes, especially in online learning when facing pandemics.

## Method

The research included quantitative research with Pre-experiment (non-design) research methods. The free variables in this research are google classroom-based online learning on the concept of the human reproductive system, while the bound variables are students' learning outcomes.

## Scope of Research

The population of this research is the entire class XI MIPA SMAN 2 Tasikmalaya School Year 2019/2020. The research was conducted in May 2019 during four meetings.

In one week, researchers were able to conduct two meetings, each meeting allocated for 90 minutes. In this study, researchers immediately went down the field to teach online and involved two observers who participated in the course of learning, one of the observers included was a biology subject teacher who taught in the class.

The non-probability sampling technique determined the study sample in purposive sampling. The sample consisted of one science class as an experimental class consisting of 18 male and 20 female students. This class is sampled because all students have adequate facilities and internet access to be done online learning, and the average daily re-score of biology that this class is still below the average KKM.

**Research Design**

Research design using One-group Pre-test Post-test Design type, research is done in one study group only, and samples are selected for several considerations. The design can be seen in [Table 1](#).

**Table 1.** Design Research One-group Pre-test and Post-test.

Group	Pre-test	Treatment	Post-test
Eksperiment	O <sub>1</sub>	X	O <sub>2</sub>

Description:

O<sub>1</sub>: Pre-test results (before treatment)

O<sub>2</sub>: Post-test results (after treatment)

X: Treatment (google classroom-based online learning). (Sugiyono, 2015)

**Research Procedure**

This research was conducted during three learning meetings and each meeting was accumulated in 2x45 minutes. This research was conducted in one MIPA class using google classroom based online learning with a discovery learning model whose syntax is tailored to the needs of students.

The learning steps taken by teachers are similar to offline learning such as opening, checking student attendance, followed by the syntax of discovery learning models that are made available with activities that can be done during online learning. Stimulation stages are carried out by focusing on the attention of students with images. Furthermore, the problem statement stage is carried out by guiding students to find questions that will be found answers by working on LKPD at the data collection stage. This followed by a literature-assisted observation process at the data processing stage. As for the stage of verification and generalization is done with live chat on the google classroom forum.

**Data Collection and Data Analysis**

Data from the research that has been obtained will be collected and analyzed with several techniques, including:

**Observation**

Observers will fill the observation sheet to know to measure the state of the field when conducting research. The observation sheet is given by email to each observer, who is then filled in and signed, and sent back the completed observation file to the researcher’s email.

**Documentation**

Documentation activities are carried out to provide information on how the learning process is carried out online based on google classroom. Maintain the authenticity of information that describes the field contained in the form of images in detail.

**Interview**

Interview by asking some questions verbally to the teacher related to the learning problems that have been done before. Information from interviews about the forms of learning that teachers use to teach and learning process during the covid-19 pandemic and the state of students and obstacles during the learning process at home.

**Test Methods**

Data collection in the form of student learning score measured using tests. Instruments in the form of tests are used in the form of written tests in multiple-choice questions. Details of the number of questions from the predetermined indicators include 8 questions C1, 7 question C2, and 6 questions for C3, C4, and C5. The question is given as many as 33 valid and reliable questions. The number of questions available is the result of a validity test and reliability using software Anates version 4.0.5 for windows. This test aims to measure the learning outcomes of students on reproduction theory. The learning results can be known from the pre-test and post-test score and the N-gain score of the students.

After the research data is obtained, the data is processed and analyzed by a prerequisite test, namely a normality test with a chi-squared test (X<sup>2</sup>). The data processed in this test are pre-test, post-test, and N-gain values, while the homogeneity test is done with F maximum to test pre-test and post-test data. They were followed by a hypothesis test using a one-sample t-test. This test was conducted to determine if the treatment applied can improve the learning outcomes of the study sample.

To find out the improvement of learning outcomes in students, the calculation of the N-gain value is carried out, with the criteria as shown in [Table 2](#).

$$N - gain = \frac{Sp_{post} - Sp_{pre}}{SMI - Sp_{pre}}$$

Description:

Sp<sub>post</sub>: Post-test Score

Sp<sub>pre</sub>: Pretest Score

SMI: Ideal Maximum Score

**Table 2.** Criteria *N-gain* Score

Nilai <i>N-gain</i>	Kriteria
$N-gain > 0,70$	High
$0,30 \leq gain \leq 0,70$	Middle
$N-gain < 0,30$	Low

(Sitorus & Surya, 2017)

**Results**

An instrument to measure the results of learning as many as 33 questions in the form of multiple choice. The instrument, based on indicators of learning outcomes consisting of remembering ability (C1), understanding (C2), applying (C3), analyzing (C4), and evaluating (C5), (Anderson et al., 2001).

**Pretest and Posttest Scores**

The test was conducted in this study twice including a pre-test that intends to see the learning results of students before carrying out online learning based on google classroom and post-test

**Table 3.** Statistics Data Pre-test and Post-test Learning Results

Statistik	Pre-test XI	Post-test XI
Maximum Score	24	32
Minimum Score	7	17
Range	17	17
Average	14,71	24,44
Variance	3,71	4,23
Standard deviation	13,83	17,92

Table 3 shows the results of the pre-test and post-test of students learning results. Pre-tests have an average score of 14.71, while post-test has an average score of 24.44. In this study, the average post-test score was better when compared to the pre-test score. Hypothetical testing includes a one-sample t-test that can be described as follows:

**Table 4.** Results of One-Sample T-Test on Pretest and Post-test Scores.

$t_{count}$	$t_{table}$	Analysis Result	Conclusion	Description
-15,39	-2,04	$t_{count}$ located in the area of rejection $H_0$	Reject $H_0$	There is an increase in students learning outcomes using google classroom-based online learning.

Description:

$H_0$ : There was no increase in students learning outcomes using google classroom-based online learning on reproductive system concepts in science classes

$H_a$ : There is an increase in students learning outcomes using google classroom-based online learning on the concept of reproductive systems in science classes

Therefore, hypothesis testing is continued by using a t-test. The test consists of one sample t-test for pre-test and post-test scores. The hypothetical testing rule used is to accept  $H_0$  if  $- T_{table} < T_{count} \leq + T_{table}$ . As for the results of the analysis, shown in table 4. In this study, two tests' achievement of students' learning results was measured by pre-test and post-test. from the results of both tests, the data was then tested with a hypothesis test obtained using one sample T-test that showed T count - (15.39) and T table (-2.04), which showed that T count lies in the rejection area  $H_0$ . The conclusion of the test is to reject  $H_0$ , which means there is an increase in students learning outcomes with google classroom-based online learning on the concept of reproductive systems in science classes.

The results of hypothetical testing with one sample T-test can only prove the extent of the increase in students learning outcomes with google classroom-based online learning. Meanwhile, the increase in students' learning outcomes obtained during the google classroom-based online learning process is determined by the *N-gain* value obtained by the students.

**Student *N-gain* Score**

After knowing the students' pre-test and post-test scores, determine the value *N-gain* aims to improve student's learning outcomes. The average post-test, pre-test, and *N-gain* scores were obtained on each indicator of the following chart learning results.

Figure 1 shows a comparison of the average post-test score and pre-test of students learning results for each indicator of learning outcomes. The highest average pre-test score obtained is in the apply indicator (C3) of 0.58, while the lowest average post-test score is found in the analyze indicator (C4), which is 0.33. Then, the highest average post-test score is found in the apply indicator (C3) of 0.82. Meanwhile, the lowest average post-test score is found in the evaluating indicator (C5), which is 0.68.

**Discussion**

In this study, online learning based on Google Classroom on the reproductive system concept was conducted with a sample of 38 students in science class. Before conducting online learning based on Google Classroom, researchers conducted interviews related to learning that teachers have presented to continue learning during the pandemic. The teachers interviewed also participated as observers and saw and participated in learning activities throughout the meeting. Students must pre-test before starting google classroom-based online learning on the concept of reproductive systems in science classes.



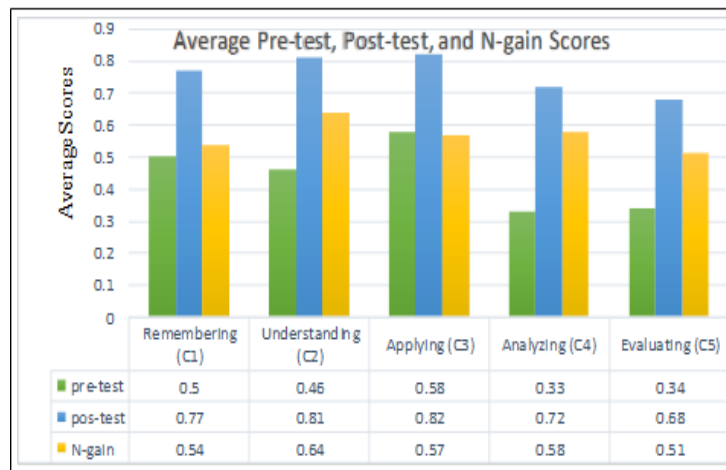


Figure 1. Average Pretest scores and Posttest students Learning Outcomes with Google Classroom-Based Online Learning

Pre-test setup is done with the features already available in google classroom, namely, google form and additional Timify add-on as a timer feature when working on tests. After students do google classroom-based online learning, students are required to return to the post-test. Post-test implementation done with the number of questions, time, features in google classroom and add-ons is the same as the pre-test.

There is a difference in mean numbers between the post-test results of students after googling classroom-based learning and the pre-test results of students before doing google classroom-based learning. These results indicate an increase in students learning outcomes after doing better Google Classroom-based online learning than the students learning outcomes before doing google classroom-based online learning. We are supported by an N-gain of 0.57 that interprets the improvement of learning outcomes in the medium category. The results of online learning tests support this condition have improved students' learning outcomes (Kuntarto, 2017)

In practice, learning activities that use google classroom-based online learning are performed very well. This is characterized by the high participation of students in learning activities using online learning based on google classroom, more efficient and flexible. The advantages of online learning are in terms of time, namely

unlimited access. IoT in Industrial Revolution 4.0 is the spearhead of all aspects so that online learning is appropriate learning (Pangondian et al., 2019). Online learning based on google classrooms is done by combining discovery learning models that each stage of syntax is tailored to students' circumstances in the learning process.

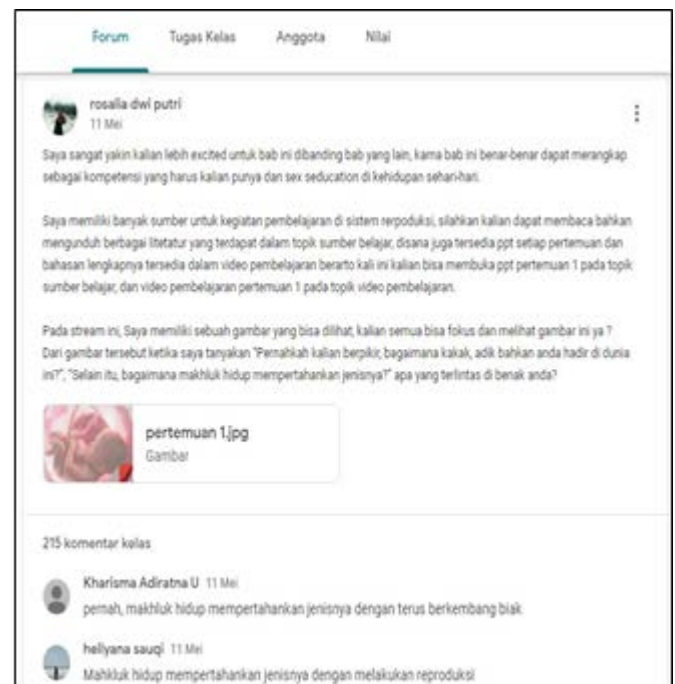
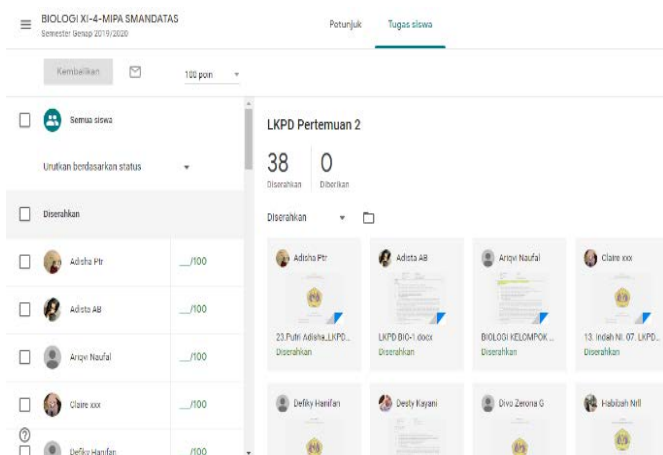


Figure 2. Live Chatt during stimulation stage

Figure 2 is a snippet of conversation on the syntax of stimulation done by giving an image on the google classroom forum, then followed by a problem statement by provoking student questions through a live chat conducted with the teacher. Figure 3 is the final result of LKPD collection that has previously gone through the data collecting and data processing stages assisted by the resources that have been provided by teachers in google classroom and LKPD filling. Simultaneously, the verification stage is carried out with online presentation activities to present the findings. Assisted by Vidio brief material explanation of teachers to help optimize the assisted generalization stage uploaded on google classroom.

Basically, the indicators of learning outcomes have different characteristics from each other. However, all of them are essential instruments in achieving learning

objectives. Average N-gain for five measured indicators ranging from remembering, understanding, applying, analyzing, and evaluating (C1-C5) (Anderson, Lorin & Krathwol, 2001).



**Figure 3.** Final Result of LKPD

Overall it belongs to a moderate category. The understanding indicator (C2) is the indicator with the highest average N-gain of any other indicator (0.64).

It is concluded that achieving maximum results in the understanding indicator (C2) is relatively easy for students to do because this indicator is included in the low cognitive tax. Students' understanding is seen from building the meaning of the material delivered into informational messages, both oral and written (Effendi, 2017).

These results align with the situation in google classroom-based online learning research because it contains activities to find and process information that is mostly very relevant to daily life at puberty. Processes in the category of understanding include interpreting, classifying, summarizing, inferring, comparing, and explaining can be appropriately done to understand a problem can be edified.

The indicator with the lowest average N-gain of pre-test and post-test results compared to other indicators is the evaluating indicator (C5) in the post-test result of (0.51). Although this indicator has the smallest N-gain value, this number still interprets the binding of students learning outcomes in the medium category (Ekawati et al., 2015).

If looking at some learning abilities, it is concluded that achieving maximum results in the evaluating indicator (C5) is very difficult for students because this indicator is included in the highest cognitive tax on the questions presented. According to the students are said to be able to evaluate if they can make a consideration based on existing criteria and standards (Effendi, 2017). The cognitive processes in this indicator are carried out by examining and criticizing.

The results are also supported by the weak state of the field related to the verification stage carried out by students in proving the observation results are only supported by live-chat discussions in google classroom forums so that the discussion process becomes less verbally accessible and triggers misevaluating in reviewing the concept of the human reproductive system.

Meanwhile, other indicators ranging from C1, C3, C5, including the ability to remember, understand, and equalize, each of the average post-test scores are (0.54), (0.57), and (0.58). The average score of these three indicators is located between the lowest score (C5) and the highest score (C1), with a relatively small difference. Overall, the average N-gain of pre-test and post-test learning results of students is interpreted in a moderate category, while the score of each indicator on the pre-test compared with the post-test has increased in each indicator to the pre-test score.

The increase in students learning outcomes is supported by online learning, namely, google classroom, but other essential factors such as the material raised, namely the human reproductive system. The human reproductive system includes material that can be delivered meaningfully because the age of students in grade XI enters puberty. This is directly proportional to a more profound curiosity about puberty, although some student learning outcomes have not increased to the maximum (Karo & Rohani, 2018). There is a possibility of differences in learning achievement if done with other materials.

Google Classroom is a learning media that is efficient enough to conduct learning in the middle of a pandemic. Distance learning is designed online by integrating various learning activities with the right technology and carefully designed in the LMS (Learning Management System) to run effectively (Bonk & Zhang, 2006). In addition to the role of teachers in designing learning, students also take a big part to be disciplined and careful in carrying out online learning with google classroom. A self-learning mentality is vital to carry out this type of learning (Leyrer-Jackson & Wilson, 2018).

The support provided by teachers for participants entering a learning environment in online learning is significant so that students can learn independently that determines the success of learning (Herrington et al., 2003). In addition to internal factors as determinants of online learning success, learning media in the form of google classroom is an external factor that also takes part to make learning activities effective due to the interaction of teachers and students (Bukit, 2014) optimizing the features contained in google classroom as a medium becomes an effort to make this learning run effectively. Features that can be used, such as google calendar, remind the schedule of meetings that will be notified via email to

both students and teachers, assignments feature, grinding feature, chatroom features, and centralized data storage because all its features are integrated with Google.

Online learning eliminates the prepositions of the learning model applied because the steps of each model have not been able to be implemented thoroughly compared to offline learning (Tseng et al., 2016). Another obstacle when giving the test is the re-entry link of students who are late in submitting because the researchers use the timify add-on. This add-on requires students to discipline the test church. There needs to be an effort to overcome the shortcomings and disadvantages of google classroom-based online learning in order to get more satisfactory results.

The authors suggest for research that has been done that Biology Teachers can apply online learning based on Google Classroom as alternative learning in the learning process. In implementing Google Classroom-based Online Learning, it is expected that Teachers will be able to modify each step of online learning activities and can be used as a reference for further research.

## Conclusion

Based on the research conducted, it can be concluded that online learning based on Google Classroom in science class on the human reproductive system concept can improve students' learning outcomes. The average pre-test score was 14.71, while the post-test was 24.44. It is known that the increase in students learning outcomes seen from the N-gain of 0.57 is interpreted in the category of increasing students learning outcomes in the medium category. The highest indicator of improvement is in the understanding indicator (C2) of 0.64. In contrast, the lowest indicator of improvement is the evaluating indicator (C5) of 0.51.

## Declaration statement

The authors reported no potential conflict of interest.

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