Using Google Classroom for Flipped Learning Model and Its Effect Students' Learning Outcomes in Chemistry

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Abstract. This study aims to determine the effect of using google classroom on flipped learning toward student learning outcomes in chemistry. The research method used was a quasi-experiment with a posttest only control group design. The study was conducted in one of the public high schools in Jakarta with 70 students as a sample of class XI selected by purposive sampling. The experimental class uses Google classroom-flipped learning, while the control class uses 2013 curriculum-based active learning. The instruments in this study are learning outcome tests and online learning readiness questionnaires. The results of data analysis show that the average student learning outcomes with the experimental class is 85.37, and the control class is 82.60. The results indicate a significant difference at $\alpha=0.05$. Based on the results of the online learning readiness questionnaire, it was found that 45.7% of students needed time to adjust to being ready to study online. So it can be concluded that chemistry learning using google classroom-flipped learning has a positive effect on learning outcomes, and students are ready to study online.

1. Introduction

The Curriculum-2013 as a national curriculum is designed with active learning patterns and student-centered. Students are expected to be better able to make observations, reason, ask questions and communicate after students take part in learning. In other words, the curriculum-2013 is an effort to prepare students to have the competence to face the challenges of the 21st century. One of the challenges of the 21st century is globalization and advances in technology and information. Therefore, relevant competencies that must be possessed by students are the ability to communicate, use technology, critical thinking, and the ability to live in a globalized society [1].

In the curriculum-2013, a learning model based on Information and Communication Technologies (ICT) was developed to encourage students to have competence in using technology and processing information. This learning model can improve learning outcomes and student retention [2]. Based on the results of observations and interviews, learning carried out in schools has not used ICT optimally, is still limited to the use of power point. So, student learning outcomes are not optimal, because students are less enthusiastic and tend not to pay attention to teacher explanations.

The survey results of the Indonesian Internet Service Providers Association (APJII) in 2018 stated that the largest Internet users based on age 15-19 years old were at 91%. While based on the level of education, high-school students obtain survey results of 90.2%. Then the use of the internet-based on work is students get 71.8%. The technological devices used to access the Internet are 44.16% smart

phones and 4.49% laptops. The most accessed services are chatted (24.7%), social media (18.9%) and education (9.6%). Based on the results of the APJII survey, ages 15-19 years are the age of high-school students using the Internet in their daily lives. Thus, the survey results indicate the need for the use of the Internet in educational content for high-school students who can motivate students to learn effectively. The use of the Internet as an educational media is a model of future education that is more interactive, interesting and fun in learning [3].

Based on the above problems, it is necessary to have a variety of learning that utilizes technology as a learning media so that learning attracts students. Google classroom is one of the technologies in learning that can be used to train students to have the competence of information and communication technologies (ICT). Several studies on the use of google classroom have been conducted, which states that google classroom increases student learning participation and innovation in the classroom [4]. The use of google classroom can improve student learning outcomes [5]. Another study, revealed that students could use google classroom optimally through the learning process, uploading work results, so the learning process is more effective [6]. Google classroom helps teachers monitor students to understand the subject matter and implement teaching 21st-century skills [7]. In addition, google classroom helps students and teachers to download subject matter, disseminate and collect assessments and is easily accessible without time constraints [8]. It is time to integrate learning with google classroom because its features that greatly help. Students think google classroom is effective as an active learning tool [9].

The flipped learning model is one learning model that requires ICT-based media. The flipped learning model is a model that learns a new material by reading or watching videos of learning independently (at home), and then in class the students are discussed it [10]. Flipped learning model by utilizing technology can train students' ability to develop their own learning styles at home [11]. In addition, flipped learning can improve student discussion, because in the classroom, students can work in groups to do assignments [12]. Some studies state that the flipped learning model can improve student learning outcomes, motivation and retention [13, 14, 15]. In addition, revealed that learning by using flipped classroom models is effective and increases the ability of students to understand the subject matter [16,17]. Students can replay learning videos and learn with their own learning styles. In addition, flipped learning can increase students' confidence and positive attitudes in learning [18]. This study was conducted to determine the effect of using google classroom as a supporting media on flipped learning toward student chemistry learning outcomes.

2. Research Method

This research was conducted in one of the State High Schools in Jakarta in the XI MIPA class of the 2018/2019 academic year. The research design used was quasi experiment, with posttest only control group design. Chemical material is given with the same time span, namely three meetings with a duration of four hours. The research stages are presented in Figure 1.
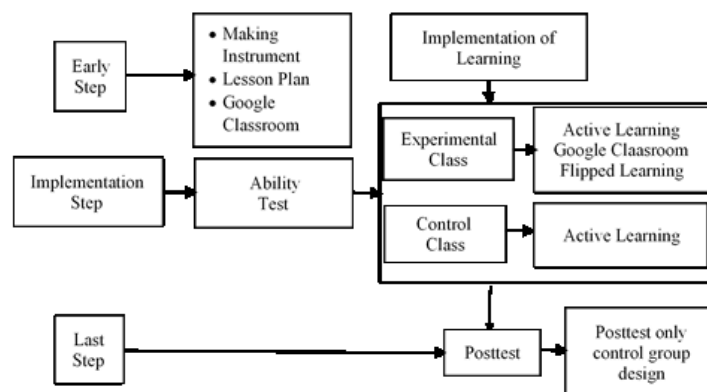
Figure 1. Research design

The samples in this study were 70 students in two classes taken through a purposive sampling technique. Both classes are given different learning models with equal student abilities. The instruments in this study were multiple-choice learning outcomes and online learning readiness questionnaires for students. The data analysis technique used the t-test with a significance level of 0.05.

3. Result and Discussion

The data obtained in this study are data on learning outcomes and student opinions about google classroom-flipped learning. Furthermore, the data is processed and analyzed with the results as below.

3.1. Students' learning outcomes

The differences in student's learning outcomes between the two classes through the results of the posttest scores were analyzed through the t-test: two-sample assuming equal variances. The t-test results of the experimental and control classes are shown in Table 1.

Table 1. t-test result on experimental and control class

| Statistic	Experimental Class	Control Class
Mean	85.37	82.60
Variance	31.41	18.48
Observations	35	35
Pooled Variance	24.94	
Hypothesized Mean Difference	0	
Df	68	
t Stat	2.32	
P(T<=t) one-tail	0,011	
t Critical one-tail	1,66	
P(T<=t) two-tail	0,023	
t Critical two-tail	1,99	

Based on table 1, it is known that the average posttest score of the experimental class is greater than the control class. The Mean score of the experimental class is 85.37 while the mean score of the control class is 82.60. The hypotheses test one-tail with a significance level of 0.05, is t-count 2.32 and t-table 1.66. This shows that there are significant differences between the average learning outcomes of students in the experimental class and control class. This is in line with the research that shows the use of google classroom in learning can improve student learning outcomes [19]. The results of another study show that students with the flipped learning model have been learning outcomes that are better than students with conventional learning models [13].

Several factors cause google classroom-flipped learning to be better than active learning. The first factor, the use of google classroom can improve learning outcomes because students are used to being used to using gadgets so learning becomes effective. This is in line with the research showing that the use of google classroom in learning by using familiar technology can improve learning outcomes [19]. The second factor, learning becomes easily accessible wherever and whenever and students feel they have a flexible time to learn because learning content can be played back [9]. The third factor, the use of google classroom can improve the interaction between students and researchers. Google classroom can increase student learning participation and innovation in the classroom [4]. The fourth factor, flipped learning makes students learn to use learning videos that can be replayed so that students are able to capture material at their own pace. This is in line with the statement that students can learn to use videos so that they are more flexible, easy to carry and learn with the speed of capturing their respective material [16]. The fifth factor, flipped learning can motivate students to learn independently and have a sense of responsibility to complete their tasks through practice questions are given before class learning begins.

Flipped learning model can foster the characteristics of students namely independent learning, awareness of students and making decisions [20].

3.2. Online learning readiness questionnaire results

The student readiness questionnaire is used to determine the readiness of students in learning online. The studens' online learning readiness questionnaire results are presented in Figure 2.
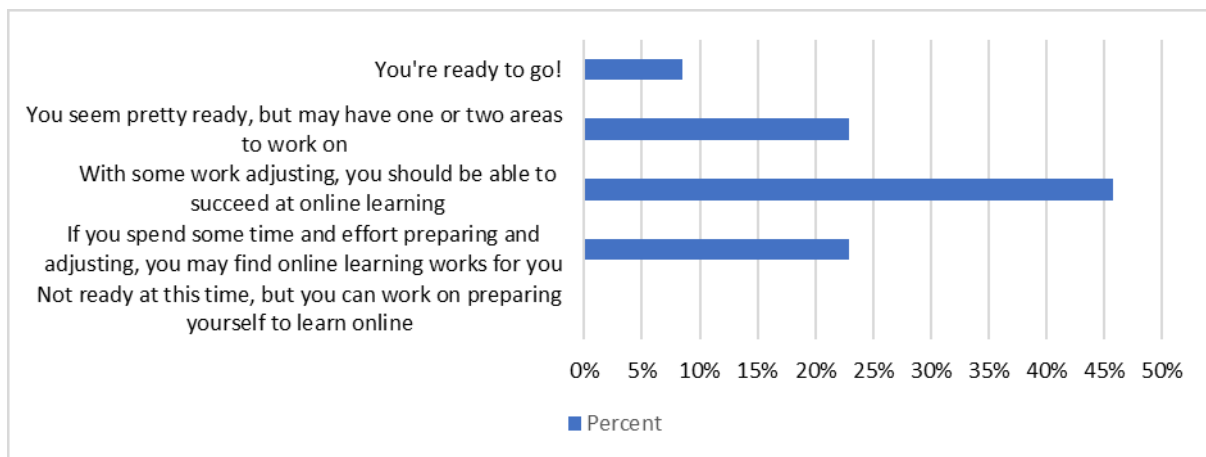
Figure 2. Online learning readiness assessment

Figure 2 shows that 45.7% students need time to adjust to learning on-line. In addition, a learning model is needed that can support the improvement of learning skills and time management before on-line learning begins. This is in accordance with the results of the study that students feel more prepared with the flipped learning model and online learning [21]. The opinions of some students about flipped learning using google classroom as follows.

"In my opinion, my opinion learning using the flipped learning method is quite good because in this system discussion of learning and assignments can be given to students if the lesson schedules in the school are less than optimal as there are cut off hours and holidays" (students 2, April 14, 2019).

"It is enough to help use online media, so when there is material that is confused, you can immediately ask without having to meet face to face" (students 16, April 14, 2019).

"I became more mentally prepared in learning and worked on tests in the future and also convinced that I was used to practicing using google classroom" (students 23, April 14, 2019).

The opinions of some students are in accordance with research which states that the use of flipped learning provides learning opportunities that are more ready, flexible and responsible in class and online learning [22]. Flipped learning is proven to increase motivation and make students comfortable in learning and examinations [15].

The use of Google classrooms has a positive influence on the field of technology utilization and combined with the use of flipped learning, which has a positive influence on learning, making learning more diverse. This is in line and supporting 21st century learning that utilizes technology and innovation in the learning process. The use of technology-based learning models can help teachers monitor and train students to have 21st century competence. This is in accordance with [7] statement that learning models that combine face-to-face with online material through technology can help teachers monitor students to have 21st century competence.

4. Conclusion

Based on the results of research and data analysis it can be concluded that the application of google classroom on the flipped learning model has a positive effect on student chemistry learning outcomes. This is because google classroom makes learning becomes more fun, motivates students and is in accordance with student habits in the use of technology. Meanwhile, the flipped learning model improves the student's readiness to learn with online learning.

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Acknoweledgments