

The Effect of Google Classroom as A Tool in Chemistry Learning

Maria Paristiowati^{1*}, Zulmanelis¹, Dessy Indira U¹, Novita Lutfi K¹

¹Department of Chemistry Education, Universitas Negeri Jakarta

*Email: maria.paristiowati@unj.ac.id

ABSTRACT

The development of information and communication technology in the 21st century has had an impact in the field of education. One of them is the development in the learning model that uses a lot of information and communication technology-based media. One of the technologies in learning that is currently widely used is Google Classroom. Google classroom is an open-source application from Google that can be used for learning and can be referred to as e-learning. This study was aimed to understand the effect of using Google Classroom in chemistry learning on student learning outcomes. Google Classroom in this study was used as a medium that contains learning videos and LKPD that could be accessed by students. This research was conducted in one of the State High Schools in Jakarta with a sample of 72 students in class X. The research method used was quasi experiment with posttest only control group design. The sampling technique in this study was purposive random sampling. The instrument in this study was in the form of a test of learning outcomes in the form of descriptions and questionnaires for students' online learning readiness. The results showed that the average student learning outcomes of the experimental class were 83.972, while the control class was 78.528. These results differed significantly at $\alpha=0.05$. So it could be concluded that Chemistry Learning with the help of Google Classroom media had a positive influence on student learning outcomes.

Keywords: Google classroom, learning outcomes, chemistry learning

1. INTRODUCTION

The 21st century can be said to be a century of knowledge, that is a century marked by the massive transformation of agrarian societies towards industrial societies and continuing into knowledgeable societies [1]. Life in the 21st century requires a variety of skills that must be mastered by someone, including information literacy skills and the use of technology [2]. Education must also be in line with the development of the revolution 4.0 system so that students have extensive expertise and knowledge [3].

This time, Indonesia has implemented the 2013 curriculum which is a national curriculum oriented to meet the criteria of the 21st century. One of the characteristics is using technology in the learning

process to fulfill the balance between attitudes, skills and knowledge to build students' soft skills and hard skills in the 2013 curriculum [4]. In addition, it was also stated that the learning approach in the 2013 curriculum is student-centered, which means students are actively involved in the learning process and develop students' communication skills [5] in enGauge 21st Century Skills, stated that learning skills in the 21st century digital era include several components including scientific and technological literacy related to science processes and the use of technology in learning.

The facts show that chemistry which is one part of science still have low learning outcomes nationally. Ministry of Education and Culture of Republic Indonesia called the National Exam (UN) at the high school level for the past 3 years a decline in value. The decrease in value that occurred in the chemistry study

alone was 2.6 points. One of the factors that caused the decline was the examination system that changed from paper-based to computer-based, known as UNBK (Computer-Based National Examination). In addition, based on the results of observations, the use of technology in learning in schools is still lacking and does not vary and does not involve students actively in learning. This is because the teacher considers the use of technology in learning difficult to apply. Chemistry lessons are also often associated with boredom and reluctance which results in failure for some students. Based on the results of observations, this is because chemistry learning now carried out in high school is more dominated by teachers so students tend to only passively listen and accept the understanding given by the teacher.

In teaching and learning activities in the classroom, the use of learning methods or approaches is a factor that has a considerable influence on learning activities [6]. Ekayani in his research revealed that one strategy that can influence student learning outcomes is the use of interesting learning media [7]. To answer the challenges of 21st century learning, a paradigm shift in the education system is needed to deal with every aspect of global life [1]. The change in question is a pedagogic change, namely the transition of the learning process from traditional teaching to technology-based teaching [8].

In facing globalization, the internet has become one of the media that has a big influence. The internet can provide information within a scope that is not limited to space and time. As is known, the internet has a very wide network in all areas of life, including in the field of education. The internet provides various information that can support the learning process. The use of the Internet as an educational media is a model of future education that is more interactive, interesting and fun in learning [9]. Technology and internet-based learning (E-learning) is a form of information technology development that can be used as a learning media [10]. There are various types of e-learning that have been developed in the world of education, one of which is the Google Classroom [11].

Google Classroom acts as a medium that can be used by teachers to create online classes, where teachers can provide learning material and tasks that must be done to students that they will receive directly and can be easily accessed anywhere. Google Classroom is a mixed

learning platform developed by Google for schools which aims to simplify paperless creation, distribution and assignment [12]. The Google Classroom can attract students to get used to learning to use technology and improve learning outcomes (Bondarenko et al., 2019). In addition, Google Classroom can help teachers save time, keep classes organized, and improve communication with students [13]. Learning using Google Classroom can increase student learning participation and provide innovation in learning [14]. This technology-based learning can encourage students to meet the demands of 21st century skills and the 2013 curriculum related to active learning and the use of technology. The meaningful learning principle can be reflected because of the active classroom atmosphere, this system can also stimulate students' curiosity in learning and make students more focused so that the quality of learning in the classroom and its effectiveness can be improved [15].

2. METHOD

2.1 Population and Research Sample

The population in this study were 72 students of class X in one of the State High Schools in Jakarta which were divided into two groups, namely 36 students in the experimental group and 36 students in the control group. The research sample was selected using the purposive random sampling method.

2.2 Data Collection Method

The method used in this study was Quasi Experiment. The independent variable in this study was the use of Google Classroom in the experimental class, while the dependent variable was student learning outcomes. Furthermore, the effect that occurred between the independent variables and the dependent variable was analyzed based on differences in student learning outcomes between the experimental groups given learning with Google Classroom and the control group given active learning and discussion. The design of this study was Post Test Only Control Group Design.

2.3 Research Flow

In this study, the steps taken to achieve the desired goals were as shown in Figure 1 below:

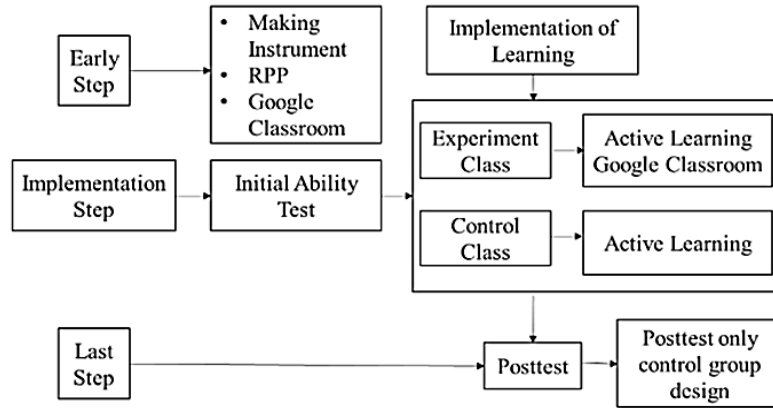


Figure 1. Research flow

3. RESULT AND DISCUSSION

Before the research was conducted, the experimental class students were given an online learning readiness questionnaire that they had to fill out. This questionnaire was aimed to find out how ready students are to be given technology-based learning. The questionnaire was filled by experimental class students. The online learning readiness questionnaire results are as follows:

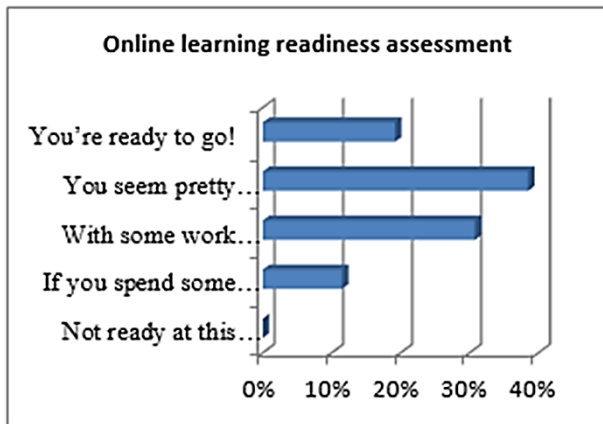


Figure 2. Online learning readiness assessment

Based on figure 2, category A (score 1-7) showed that students were not ready to do online learning now. Based on the results of the questionnaire it could be seen that there are no students in this category. Category B (scores 8-16) indicated that students would be interested in learning online if they try to adjust. There were 12% students in this category. Category C (scores 17-26) showed that students would be ready to learn online with hard work and adjustments. In this category there were 31% students in it. Category D (score 27-33) showed that students were ready, but the results would be more optimal if online learning was done

continuously. There were 39% students in this category. Category E (score 34-40) showed that students were very ready to learn online. There were 19% students in this category. Based on these results, it could be concluded that online learning could be applied to the class.

To get data related to the effect of using Google Classroom on student learning outcomes, in this study the student learning outcomes of the experimental group were compared with the control group. Differences in student learning outcomes in both groups were measured through the results of the posttest scores. The posttest results of the experimental and control groups are as follows:

Table I. Posttest data of the experimental group and the control group

Statistic	Experimental Class	Control Class
Amount Students	36	36
Average	83.972	78.528
Highest Score	97	94
Lowest Score	76	70

Based on the table I, it could be seen that there were significant differences in the posttest score between the experimental group and the control group with the average posttest score of the experimental group higher than the control group. The highest score of the experimental group was 97 while the highest score of the control group was 94. The lowest score of the experimental group is 76 and the control group is 70.

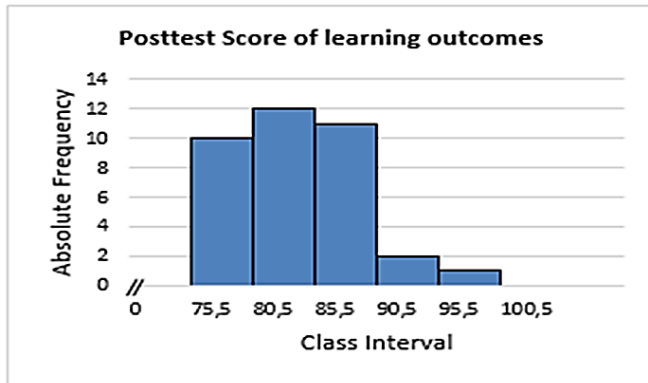


Figure 3. Frequency distribution posttest score of learning outcomes of experimental class students

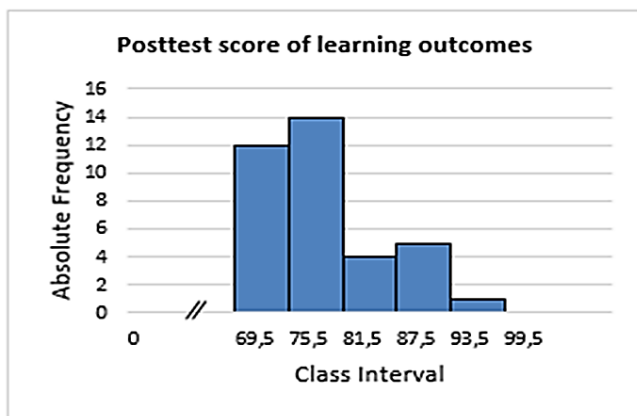


Figure 4. Frequency distribution posttest score of learning outcomes of control class students

Based on testing the hypothesis by using the t test that had been done, the value of t-count was 9.27 and t-table was 1.673. This showed that the value of t-count > t-table. This result meant that H₀ is rejected, which meant that student learning outcomes in the experimental class were higher than the student learning outcomes in the control class. The results of the study were obtained from learning outcomes on the cognitive aspects of students. The average score of the experimental class learning outcomes was 83.972 while the average score of the control class learning outcomes was 78.528. This showed that student learning outcomes on the subject of redox in the experimental class using technology-based active learning with Google Classroom was higher than student learning outcomes in the control class with active learning.

Significant differences in learning outcomes in the experimental class and control class students were caused by several factors. The first factor was that students were accustomed to using gadgets in their daily lives. This was related to student learning habits in the modern era which makes gadgets the main media

supporting learning. The results of student interviews related to the use of Google Classroom in redox learning also showed positive reactions from students. Some students said that they feel comfortable learning to use Google Classroom because they were used to using gadgets, they could also easily operate the Google Classroom because it looked simple and easy to understand. The opinions of some of these students were consistent with the research conducted by Iftakhar, students agreed that Google Classroom was an effective and easy to use media. Students could easily get learning material files accessed anywhere and anytime [13].

The second factor was in the experimental class learning instruments such as LKPD and learning videos uploaded to Google Classroom one day before learning in class, so students could learn the material first before implementing classroom learning. In addition, after the learning ends the teacher also uploaded a review video related to the learning material that had been learned into the Google Classroom, making it easier for students to repeat learning outside the classroom and preventing students from getting information from the wrong source. All instruments uploaded in the Google Classroom would not be lost so students can open them anytime and anywhere. Based on the results of interviews, students also gave positive responses regarding this matter. Some students felt helped because LKPD and learning videos were uploaded before learning in class so that they could learn it first at home. They also argued that the video review material uploaded by the teacher was very helpful for them in repeating the material they had learned. This was in line with research conducted by Shahraneer [16] which revealed that learning integrated with Google Classroom provided very helpful features. Research conducted by Biantoro and Bondarenko also revealed that with Google Classroom students could access material anytime and anywhere [17, 18].

The third factor was the existence of notifications regarding the deadline for collecting tasks. Students argued that the notification helped them remember the assignments given and made them timelier in collecting assignments. If there were things that were not clear, students could also ask the teacher or friends about this in the comments column or personally use the message feature in the Google Classroom. The results of research conducted by Iftakhar and Heggart revealed that learning with Google Classroom could increase student learning and innovation in learning, Google Classroom also facilitated interaction between teachers and students and between students with each other [13, 14]. But the interaction between the teacher and students and between students with each other did not work

optimally, this was because students prefer to ask questions directly to the teacher in the class.

In addition to these advantages, there were also obstacles such as networks that were sometimes weak and even break up when students used Google Classrooms in the classroom so learning was a little disturbed. In addition, there were students who were not accustomed to using gadgets to study, so there was little difficulty when using Google Classroom. This obstacle could be overcome a little by the teacher who also displays the instruments in the Google Classroom in front of the class. In addition, in the next meeting students had anticipated bad network constraints by downloading instruments found in the Google Classroom before entering class, so students could directly open the instrument in class.

Whereas in the control class, active learning was applied which was also student centered oriented with the help of PPT media. LKPD was given in hardcopy and learning videos were displayed when learning takes place in the classroom so the mainstay of students is their respective notebooks. In addition, in the control class there was also no video review of material that they could learn back at home, discussion of the material that had been studied was only briefly discussed at the end of the lesson which could help them obtain additional information regarding the material that had been learned at the meeting at that time.

Based on the description above, the use of Google Classroom in redox learning had a positive influence on learning. In addition, the learning process was also in accordance with the characteristics of the 2013 curriculum and 21st century learning about the use of technology and innovation in the learning process. The use of technology-based media in learning made it easier for teachers to monitor and train students to have 21st century competence.

4. CONCLUSION

Based on the results of research, data analysis and hypothesis testing that had been done, it could be concluded that the application of Google Classroom in chemistry learning had positive influence on student learning outcomes in class X. This was also because students were ready to do online learning even though there were 12% of students still had to adjust.

REFERENCES

[1] Soh, T. M. T., Arsada, N. M., & Osman, K. (2010). The relationship of 21st century skills on students'

attitude and perception towards physics. *Procedia - Social and Behavioral Sciences*, 7(2), 546–554. <https://doi.org/10.1016/j.sbspro.2010.10.073>

- [2] Zubaidah, Siti. (2016). Keterampilan Abad Ke-21 : Keterampilan Yang Diajarkan, (2), 1–17. <https://doi.org/10.1021/acs.langmuir.6b02842>
- [3] Umachandran, K., Jurcic, I., & Ferdinand-james, D. (2018). Gearing up education towards Industry 4.0. *International Journal of Computer & Technology*, 17(2), 7305-7312.
- [4] Kemdikbud. (2013). Kerangka Dasar dan Struktur Kurikulum 2013, pp. 1–21.
- [5] NCREL, & Group, M. (2003). *enGauge 21st Century Skills: Helping Students Thrive in the Digital Age*. Naperville, IL and Los Angeles, CA: NCREL and Metiri.
- [6] Novela, M., Amrul, B., & Hermansyah, A. (2017). Perbandingan Hasil Belajar Siswa Dengan Metode Index Card Match dan Bamboo Dancing. *Alotrop*, 1, 123–126.
- [7] Ekayani, N. L. P. (2017). Pentingnya Penggunaan Media Pembelajaran Untuk Meningkatkan Prestasi Belajar Siswa.
- [8] Afandi, Junanto, T., & Afriani, R. (2016). Implementasi Digital-Age Literacy dalam Pendidikan Abad 21 di Indonesia. *Prosiding Seminar Nasional Pendidikan Sains*, 113–120. Retrieved from <https://media.neliti.com/media/publications/173402-ID-none.pdf>
- [9] Goyal, S. (2012). E-Learning : Future of Education. *Journal of Education and Learning*, 6(2), 239–242.
- [10] Hartanto, W. (2016). Penggunaan E-Learning sebagai Media Pembelajaran. *Jurnal Pendidikan Ekonomi*, 10(1), 1–18.
- [11] Saito, T. (2010). Fostering collaboration via google apps, 1–9.
- [12] Imaduddin, M. (2018). *Membuat Kelas Online Berbasis Android Dengan Google Classroom: Terobosan Pembelajaran Era Revolusi Industri 4.0*. Yogyakarta: Garudhawaca.
- [13] Iftakhar, S. (2016). Google classroom: what works and how? *Journal of Education and Social Sciences*, 3, 12–18. <https://doi.org/10.1002/eji.201344328>

- [14] Heggart, K. R., & Yoo, J. (2018). Getting the Most from Google Classroom : A Pedagogical Framework for Tertiary Educators, *43*(3).
- [15] Wang, Y. (2017). Advantages and Disadvantages of Computer Assisted Instruction in Chemistry Teaching, *61*(Emcs), 1231–1235.
- [16] Shahrane, I. N. M., Jamil, J. M., & Rodzi, S. S. M. (2016). The Application of Google Classroom as a Tool for Teaching and Learning, *8*(10), 8–11.
- [17] Bianoro, B. (2014). Peduli Pendidikan, Google Cassroom Buat Ruang Kelas Di Dunia Maa. *Merdeka.Com*.
- [18] Bodarenko, O., Mantulenko, S., & Pikilnyak, A. (2019). Google Classroom as a Tool of Support of Blended Learning for Geography Students.