



Exploration of Critical Thinking Skills in Digital Citizenship Course Through Online Learning

Titan Istiah Herwati

Information Technology Education,
Faculty of Teacher Training and Education
Universitas Sebelas Maret
istiahtitan@student.uns.ac.id

Basori

Information Technology Education, Faculty of Teacher
Training and Education
Universitas Sebelas Maret

Puspanda Hatta

Information Technology Education, Faculty of Teacher
Training and Education
Universitas Sebelas Maret

Abstract:

Low critical thinking skills cause students difficulty in solving problem, especially in learning. This study aims to find out the effectiveness of google classroom on critical thinking skills in Simulation dan Digital Communication. A total of 62 students participated in this research who were divided into two randomized treatments, namely 31 students in the experimental class and 31 students in the control class. In its implementation, it would compare using LMS google classroom by applying discussion groups to experimental class and control class that use google classroom, not in discussion groups. This research used a quasi experimental design with a pretest-posttest using a quantitative method. The data were collected through a critical thinking test. Before using multiple-choice pretest and posttest multiple-choice tests, instruments were tested first using validity tests and reliability tests. Google classroom as an independent variable and the dependent variable was critical thinking. Implementing learning with the help of google classroom through discussion and question features was an effort to effectively improve critical thinking skills in class. According to the result of the study, google classroom has effectiveness on critical thinking skills from the result in the experimental class of 45.609 Increased critical thinking skills in students cause students to analyze and solve problems.

Keywords: LMS; Google Classroom; Critical Thinking; Digital Citizenship

Introduction

The way a person communicates now tends to be mostly done in cyberspace, various kinds of characteristics, ideas, habits, and purpose can be found in cyberspace. Communicating in cyberspace that does not bring individuals or groups together leads to a loss of responsibility, ethics, and norms in communicating. Therefore, the importance of simulation and digital communication courses in which to learn about digital citizenship. Simulation and digital communication were learning that equips students to communicate ideas through digital media that was certainly important for students in the technology era (Anggraini & Bachri, 2018). Hosnan also said that in 2013 curriculum learning materials were explained through a scientific approach, where students were trained to observe problems, analyze, solve, and communicate using technology (Putranta et al., 2019).

In Vocational High School, students learn digital citizenship to prepare to become responsible digital citizens and conform to existing norms. To study simulation and digital communication courses also needed a strong understanding (Yanuar & Khotimah, 2018). To prepare and learn it all needs critical thinking skills. Critical thinking skills are useful for students to analyzing and concluding behaviors and actions in cyberspace especially in communicating with others whether by applicable rules and norms or not. To prepare and learn it all takes critical thinking skills. Critical thinking skills are useful for students analyzing and concluding behaviors and actions in cyberspace especially in communicating with others whether in accordance with applicable rules and norms or not. Lestari (2016) also strengthens that teachers needed to develop student's critical thinking skills to understand learning concepts, be sensitive to problems, provide solutions, be able to apply in different or similar positions, and facing various challenges. Simulation and digital communication courses required students to actively learn so that they can develop creativity and solve problems where they should be able to think critically in response the existing problems (Sepriana et al., 2019).

Based on these conditions, alternative in improving critical thinking is to implement online learning based on LMS (Learning Management System) which has discussion and questions features that can be used outside of lesson hours. Various features such as question and discussion (stream) can improve communication and critical thinking. Furthermore, LMS facilitates student's learning because their data will be saved in a cloud or database that makes learning materials can be used at any time and organized (Iftakhar, 2016).

The pandemic caused students to learn at home online, so there are limitations of research, so both classes must be conducted online. Control class discussion activities are conducted online. Meanwhile, discussion in the experiment class were conducted using the feature in google classroom. Google classroom is equipped by Google-owned facilities such as drive, docs, and various features that have been provided to support learning. The stream feature is a feature to have discussions that can be done by teachers and students. While the question feature is the question and answers feature. Teachers can have discussions and can send questions to students through virtual classes provided for the student to do, as well as students can answer through the virtual class either in private comments or class comments. Google Classroom also provides space to be able to communicate with students, ask questions, create tasks, help facilitate online learning in the digital world (Ketut Sudarsana et al., 2019).

When learning is divided into two groups, the experiment class and the control class in which it would compare the use of LMS Google Classroom with discussion and question features in experiment classes and control classes that used LMS Google classroom without discussion and question features. After providing the necessary posttest treatment contained High Order Thinking Skills. Measuring HOTS (High Order Thinking Skills) or high-level skills including problem-solving skills, critical thinking skills, arguing thinking, creative thinking skills, and decision-making skills in Bloom Taxonomy requires analyzing (C4), evaluating (C5), and making (C6) (Widana, 2017).

There are some previous works which also discuss about discussion feature in google classroom such as Rahmad and the team (2019) that the use of discussion and question features in google classroom makes it easier for students to analyzed problems or answer questions in their own language so as to practice students' critical thinking skills. In addition, Dharma Kuzmanonoska (2019) also conducted similar research using the discussion feature in Google Classroom to debates and discussions inside and outside the classroom to develop critical thinking skills. The study also added that teachers should set material content from the lowest taxonomic level to higher taxonomy.

Based on the research above, the use of online learning can improve critical thinking skills. In those study, there is no correlation between google classroom features such as discussion and question features, critical thinking, and simulation and digital communication. The hope to be achieved in this research is to find out the effectiveness of the Google classroom using the discussion and question features for critical thinking in simulations and digital communication on digital citizenship course.

From the literature review above, this research adopted theory about features in google classroom that can increase critical thinking skills. So, The purpose of this study is to find out the difference in critical thinking ability between applying google classroom with discussion and question features and applying google classroom without discussion and question features to simulations and digital communication course and knowing the effectiveness of google classroom use discussion and question features usage to critical thinking ability on Digital Citizenship course.

Research Method

Type of research used a quantitative approach. The purpose of quantitative research is to find out the relationship between variables and test existing hypotheses. The method used is quasi experimental design. This method was chosen because the study could not control all the variables that influenced the research process. Besides, experiment and control groups have been formed from scratch, without the need to create new groups again (W.Creswell & Creswell, 2018). In this design, there are two classes: experiment class and control class. A study that wants to investigate the effectiveness of new learning is needed by other groups a comparison. Each class was given a pretest first, then the experimental class was given a treatment of applying stream and question features in Google classroom, while the control class used only google classroom without using stream and question features. After that, continued by working on a posttest.

The research was conducted using cluster random sampling because the samples used were not composed of individuals, but rather consisted of groups of individuals or clusters (Lestari et al., 2016). Cluster random sampling had the same characteristics and the results would represent the entire group in 10th grade of Software Engineering in the second semester (2019-2020). The sample count was 31 students for the experimental class and 31 students for the control class from software engineering department. Data collection techniques using pretest and posttest. The dependent variable in this study was google classroom and the independent variable was critical thinking.

Before using a multiple-choice tests that was pretest and posttest with case study weighted questions, instruments were tested first using validity and reliability tests. After the test, then the next research was carried out, data can be processed to test the hypothesis. Data analysis techniques used normality test to analyze statistical data and describe sample data from a variety of sources (Okeniyi et al., 2020), homogeneity tests to see samples have the same variance or not in a population (Hidayati, 2017), balance test to know the initial capabilities of both classes whether or not the same (Hidayati, 2017), and posttest results using Normalized gain tests to see how effective the use of google classroom LMS is (Khaharsyah, 2019).

Results and Discussion

To find out an increase in student's critical thinking skills of students who use LMS google classroom using discussion and question features and using LMS google classroom without using discussion and features, Google Classroom analysis of critical thinking is required using pretest and posttest scores. At google classroom, students are prepared to discuss using discussion and question features, where students will be created into groups. Each group discusses issues around case studies about digital citizenship. The teacher serves as a moderator. After that, each group will discuss and express its opinion. Then, other groups can respond to the group's statement. Before the teacher gives a conclusion, the teacher gives an opportunity to students who want to conclude from various group answers. These discussion activities help students produce interpretation, analysis, evaluation, inference, explanation, and self-regulation where it is an indicator of critical thinking ability delivered by Facione. Pretest results is obtained from the work of multiple-choice questions consisting of 25 questions points and posttest obtained from the work of multiple-choice question consisting of 23 items. Description of pretest and posttest data can be viewed in Table 1.

Table 1. Experiment Class and Control Class Average Data

Description	Experiment Class	Control Class
<i>Pretest</i>	55,23	55,10
<i>Posttest</i>	75,58	72,23

Based on Table 1 the pretest average in the control class was 55.23 and the posttest was 72.23 increased by 15.10. Meanwhile, the control class pretest average was 55.23 and posttest 75.58 was an increase of 20.35. The result of the balancing test using the independent sample t-test was $\text{sig.}0,059 > 0.05$ which meant the initial capabilities of both groups were declared balanced. Here's a critical thinking hypothesis:

H₀ There is no increase in critical thinking on the use of LMS google classroom in 10th grade of Software engineering in simulation and digital communication course

H₁ There is an increase in critical thinking on the use of LMS google classroom in 10th grade of Software engineering in simulation and digital communication course

The first hypothesis test used the Independent Sample T-test from the test results of the experimental class and control class. If the probability value (Sig. 2-tailed) < 0.05 then H₁ is accepted and H₀ is rejected. Independent Sample T-test results can be viewed in Table 2.

Table 2. Hypothesis Test Results

Variance Equation	Levene's Test		T Test	
	F	Sig.	T	Sig (2-tailed)
Assumed	0,313	0,578	2,139	0,037
Not Assumed			2,139	0,037

Based on Table 2 data of the first hypothesis test results, obtained F 0.313 with Sig. 0.578 where greater than the error level (0.05) means no variance in both classes. Thus the sig value (2-tailed) was assumed to be 0.037 where smaller than 0.05 which means the two classes have a difference then H₀ is rejected and H₁ is accepted which reads "There is an increase in critical thinking on the use of LMS google classroom in 10th grade of Software engineering simulation and digital communication course".

To find out the effectiveness of increasing the use of LMS Google Classroom using discussion and question features against the critical thinking skills of students. Thus, a second hypothesis test used the N Gain Test from the test results of the experiment and control classes. Independent Sample T-test results can be viewed in Table 3.

Table 3. Second Hypothesis Test Results

Class	Pretest Average	Posttest Average	Gain Score	Description
Experiment	55,23	75,88	45,609	Quite effective
Control	55,10	72,73	37,211	Ineffective

Based on Table 3 data of gain test results in the experimental class obtained a value of 45,609 with a quite effective category. As for the 37,211th control class with an ineffective category. From these results, it is concluded that the effectiveness of LMS Google Classroom's based learning towards critical thinking is higher than using conventional learning.

Discussion

This study aims to determine the improvement and effectiveness of critical thinking in Google Classroom focused on learning about digital citizenship. The study also looked samples in class 10th grade software engineering. After testing instruments, the next thing is to divide 2 groups, namely the experiment group and the control group.

Efforts are being made to improve their thinking in Simulation and Digital Communication courses by implementing LMS Google Classroom. The hypothesis result of the posttest value results in sig. (2-tailed) 0.037 means the value is less than 0.05 so H_0 is rejected and H_1 is accepted. Thus, it can be concluded that there is an increase in critical thinking using LMS Google Classroom through discussion and question features on Simulated and Digital Communication courses.

Anggraeni (2019) there was a significant influence between blended learning and student's critical thinking skills on temperature and calorific materials. An effective way to improved critical thinking skills is to use the methodology of applying case studies or problem-solving. It also said that the importance of using the right technology to develop critical thinking in completing case studies was faced (Bezanilla et al., 2019; Kong, 2015). That is in accordance with the research that has been done with the application of problems that use case study methodology and problem-solving to practice students' critical thinking skills.

Implementing learning with the help of Google Classroom through discussion and question features certainly has a different impact on students, the impact of which can affect student learning outcomes in simulation and digital communication. The implementation of learning with help of Google Classroom through discussion and question features the average grade in the experiment class is higher than the control class with the help of Google Classroom through discussion and question features (shown in table 1) that shows the difference in students' critical thinking ability results. Kong also said that it is important to use the right technology to develop critical thinking skills in completing case studies (Bezanilla et al., 2019; Kong, 2015)

The effectiveness of learning can be seen from the N Gain results which show that learning in the experiment class is more effective than the control class (shown in table 3). Nizal (2016) revealed that students in the study subjects were satisfied with Google Classroom, that's mean google classroom can be effective as an active learning media. Google Classroom by implementing discussion groups to make it easier for students to analyze problems or answer questions in their own language and develop critical and creative discussions (Rahmad et al., 2019; Rosita et al., 2019). Therefore, it can be concluded that the use of Google Classroom LMS has a higher effectiveness on critical thinking ability.

Once students' critical thinking skills increase students can become digital citizens responsible for the internet especially communicating on social media. Students can develop the creativity of ideas on the internet and must understand the prevailing norms and also on the internet there are already laws governing ITE.

Conclusion

Simulation and digital communication course, students are considered lacking in having critical thinking skills, so solving problems can't provide critical solutions. Digital Citizenship Material is a benchmark of how our attitude towards being citizens of cyberspace. Therefore, it takes critical thinking, so that students can know a safe way to surf in cyberspace or when receiving hoax news. Then understand what to do and not to do. This study explained the effectiveness of LMS Google Classroom to critical thinking skills using a quasi experimental design method. The results show that the LMS Google Classroom using discussion and question features can increase student's critical thinking skills. Thus, it can be said that LMS Google Classroom has higher effectiveness. It can be seen from the average final results of students showing they are able to provide solutions to the problems that have been given.

This study has some limitations. First, the results of the study cannot be generalized because the sample was small and data collection was restricted to the students of 10th grade of Engineering students. Therefore, future studies should be performed with a larger sample size, contexts, and different variables or more. Furthermore, future research should combine discussion and others.

References

Anggraeni, A., Supriana, E., & Hidayat, A. (2019). *Pengaruh Blended Learning terhadap Kemampuan Berpikir Kritis Siswa SMA pada Materi Suhu dan Kalor*. 758–763.

- Anggraini, W. D., & Bachri, B. S. (2018). Pengaruh Pemanfaatan Edmodo pada Pembelajaran E-learning terhadap Hasil Belajar Peserta Didik Kelas X Multimedia pada Mata Pelajaran Simulasi dan Komunikasi Digital di SMK NEGERI 1 JAMBON. *Jurnal Mahasiswa Teknologi Pendidikan*, 9(2).
- Bezanilla, M. J., Fernández-Nogueira, D., Poblete, M., & Galindo-Domínguez, H. (2019). Methodologies for teaching-learning critical thinking in higher education: The teacher's view. *Thinking Skills and Creativity*, 33(June), 100584. <https://doi.org/10.1016/j.tsc.2019.100584>
- Hidayati, N. (2017). Efektivitas Pembelajaran Menggunakan Multimedia Interaktif (Adobe Flash CS6) terhadap Hasil Belajar Matematika Siswa Kelas V SDN Jurug Sewon. *Trihayu: Jurnal Pendidikan Ke-SD-An*, 3(3), 169–172.
- Iftakhar, S. (2016). Google classroom: what works and how? *Journal of Education and Social Sciences*, 3, 12–18.
- Jesson, R., McNaughton, S., Rosedale, N., Zhu, T., & Cockle, V. (2018). A mixed-methods study to identify effective practices in the teaching of writing in a digital learning environment in low income schools. *Computers and Education*, 119, 14–30. <https://doi.org/10.1016/j.compedu.2017.12.005>
- Ketut Sudarsana, I., Bagus Made Anggara Putra, I., Nyoman Temon Astawa, I., & Wayan Lali Yogantara, I. (2019). The use of Google classroom in the learning process. *Journal of Physics: Conference Series*, 1175(1). <https://doi.org/10.1088/1742-6596/1175/1/012165>
- Khaharsyah, A. (2019). The Development of Android-Based Learning Media for Light Vehicle Engineering Skill Students of SMKNegeri 2 Pengasih. *Journal of Physics: Conference Series*, 1273(1). <https://doi.org/10.1088/1742-6596/1273/1/012007>
- Kong, S. C. (2015). An experience of a three-year study on the development of critical thinking skills in flipped secondary classrooms with pedagogical and technological support. *Computers and Education*, 89, 16–31. <https://doi.org/10.1016/j.compedu.2015.08.017>
- Kwon, K., Park, S. J., Shin, S., & Chang, C. Y. (2019). Effects of different types of instructor comments in online discussions. *Distance Education*, 40(2), 226–242. <https://doi.org/10.1080/01587919.2019.1602469>
- Lestari, D., S, S. M. E., & Susanti, R. (2016). Pengembangan Perangkat Blended Learning Sistem Saraf Manusia Untuk Meningkatkan Keterampilan Berpikir Kritis. *Journal of Innovative Science Education*, 5(1), 83–93. <http://journal.unnes.ac.id/sju/index.php/jise>
- Nizal, I., Shaharane, M., Jamil, J. M., Syamimi, S., & Rodzi, M. (2016). The Application of Google Classroom as a Tool for Teaching and Learning. *Journal of Telecommunication, Electronic and Computer Engineering*, 8(10), 5–8.
- Okeniyi, Joshua, O., Elizabeth, T., Atayerp, & Aaron, A. (2020). *Implementation of Data Normality Testings a Microsoft Excel Library Function by Kolmogorov Smirnov Goodness-of-fit Statistics* (pp. 2561–2578).
- Putranta, H., Jumadi, & Wilujeng, I. (2019). Physics learning by PhET simulation-assisted using problem based learning (PBL) model to improve students' critical thinking skills in work and energy chapters in MAN 3 Sleman. *Asia-Pacific Forum on Science Learning and Teaching*, 20(1), 1–45.
- Radosavlevikj, N., & Hajrullai, H. (2019). *Enhancing Learning Autonomy in an ESP Class by Using LMS Google Classroom* (Vols. 10, No 14, Issue ISSN 1857-7059, pp. 77–84).
- Rahmad, R., Adria Wirda, M., Berutu, N., Lumbantoruan, W., & Sintong, M. (2019). Google classroom implementation in Indonesian higher education. *Journal of Physics: Conference Series*, 1175(1). <https://doi.org/10.1088/1742-6596/1175/1/012153>
- Rosita, N., Saun, S., & Mairi, S. (2019). Google Classroom for hybrid learning in senior high school. *Journal of Learning and Teaching in Digital Age*, 5(1), 35–41.
- Sepriana, R., Sefriani, R., Wijaya, I., & Lestari, P. (2019). Pengujian Validitas Modul Interaktif Simulasi dan Komunikasi Digital Berbasis Macromedia Director MX. *Jurnal Ilmu Pendidikan*, 1(3), 120–126.
- W.Creswell, J., & Creswell, J. D. (2018). *Research Design*.
- Widana, I. W. (2017). Higher Order Thinking Skills Assessment (Hots). *Jisae: Journal of Indonesian*

Student Assesment and Evaluation, 3(1), 32–44. <https://doi.org/10.21009/jisae.031.04>

Yanuar, A., & Khotimah, K. (2018). Pengembangan Media Video Pembelajaran Mata Pelajaran Simulasi dan Komunikasi digital Materi Mengkomunikasikan Gagasan untuk Kelas X TKJ 1 SMK PGRI 13 Surabaya. *Jurnal Teknologi Pendidikan* 0, 0(01), 0-4 PENDAHULUAN.