

The Effectiveness and effect of Project-Based Blended Learning on Student Achievement in Online Learning

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Abstract:

Educational technology has a role in the education era 4.0, one of which is by utilizing technology-based learning in learning activities in the form of learning applications based on project tasks, namely the project-based blended learning method. This article aims to get the influence of the project-based blended learning use on the achievement of students. This study was quantitative research using a pretest-posttest control design. The sample of the research were 72 students. The data were collected by cluster random sampling divided into groups or classes. The hypothesis tests were the Independent Sample t-Test and the gain normalization test based on significant grade 0,05. The result showed that there was significant differences and improvement on students' achievement when using the project-based blended learning from the use of conventional methods in pandemic Covid-19. The result was proven by the hypothesis tests using the T-test that the post-test was 0,000 ($0,000 < 0,05$), so there was found the differences in students' outcomes between experimental class from control class. The gain normalization showed that the experimental class got 0,49 and the control class got 0,16. It can be concluded that there is an improvement in students' achievement in the experimental and control classes, therefore the use of the project-based blended learning contributes more influence to the achievement of students

Keywords: Project Based Learning; Blended Learning; Achievement of students.

Introduction

The highly development of informatics technology and internet has important aspect in education (Alsahli, Eltahir, & Al-Qatawneh, 2019). The use of technology can increase the students' achievement in term of understanding new knowledge or cognitive performance and skill for the future (Wahyudi & Winanto, 2018). The optimization of technology in education has influenced the students for being more active to have more skills like critical thinking and problem solving (Swart, 2017).

The existence of technology is very important in this education 4.0 era, as the use of technology like e-learning, edmodo, and other learning application, self study platform can be found as well based on the situation. Educational technology is a platform that has goal for enabling learning process and improving the work management by planning, developing, producing, using, and managing human source and technology properly (Surani, 2019).

In this pandemic Covid-19, the government changes the management of teaching and learning processes into online learning or technology-based learning. Covid-19 (*Corona Virus Disease*) has decreased all aspects especially education in all countries. The conventional learning by face to face in the classroom was moved to online learning by using digital technology. In the new normal era, the usage of technology-based learning can give effective and innovative service (Krishnamurthy, 2020). Online platforms are chosen for actualizing the learning process at the high school level to college. These platforms provide many functions in live or streaming learning or creating small groups for discussion. Here, *blended learning* is one of the integrations of technology and learning platforms that can interpret the small discussion groups, deliver the interactive materials and show the short quiz (Lockdown, Hall & Border, 2020).

Based on the observation and interview on graphic design subject consisting of the essential materials and basic competence, vector using *Corel Draw* application is more difficult than the others. The data showed that the result of competence test on unit "Vector" by 35 students was low where only 28 % of students pass the exam and 72 % get the score below 78 or minimal criteria (KKM), it is found that classes with the different material cant get the maximal scores as it is not appropriate with their skills.

For those cases, a conventional learning strategy should be combined with technology-based learning for adapting the era. By the integration of the modern learning model that uses technology can produce a positive effect on students' achievement as students can understand the subjects well. Volchenkova in Alsahli et al (2019) stated that *blended learning* is the teaching-learning process by using the internet that uses many applications by combining direct learning in the classroom and online learning. Dziuban et al in Alsahli et al (2019) defined that *blended learning* is a program that utilizes more than one method for communicating information to maximize the learning outcome and interaction between students and teachers (Alsahli et al., 2019).

The use of *blended learning* is usually correlated with the use of a *learning management system* (LMS). Here, *Schoology* is chosen as the one of LMS which is suitable for graphic design subject on vector material. *Schoology* is a website that integrates E-Learning with social media (Mahfoud, Moumami & Moumami, 2015). *Schoology* brings a positive impact on attitudes (Cepik, Gonen, & Sazak, 2016), helps the students to exercise autonomy in EAP class (Ardi, 2017) and enhance the college students' proficiency in Business Writing (Sicat, 2015). There are many features inside. First, *Courses* is modified for uploading materials, *job sheet*, and *assignment* were consist of *Gravit Designer* for online design application that can be used by the student to have practice in design. Second, *Group* is modified for discussion or class meetings where students and teachers can interact with each other. The last, *Resource* is applicated for sharing and having learning sources between students and teachers or teachers and teachers (Dwianto, Wilujeng, Prasetyo, & Suryadarma, 2017).

The reason why choose this case is *Schoology* correlates with the subject basic graphic design, where vector material needs *Corel Draw* application for practice. It is matched with the *Schoology* features that students can have a self-practice online design with *Gravit Designer*. Based on the score of test on vector material, the students' result is low, only 28 % can pass the test and get KKM score, 78.

Many researchers identified that *blended learning* is a new learning strategy that combines traditional learning and e-learning for improving the motivation and achievement of students (Alsahli et al., 2019). Here, the teachers can apply the integration of *blended learning* with *project-based learning*, called *project-based blended learning*. Kemendikbud Rosiyanah & Wijayati (2019) defined that *project-based learning* is

a learning model suggested in curriculum 2013 for developing student's skill in producing the qualified product.

In this 4.0 industry era, education is concerned for creating professional graduation that mastering skills and competences. Therefore, the teaching-learning process should be innovative for providing work, one of them by utilizing technology-based learning which applies learning applications based on the projects (Nurbekova et al., 2020).

Project-based learning can stimulate innovative thought by designing a creative course that supports students' creativity, critical thinking, and learning competences. The use of the appropriate learning strategy by applying technology can increase the skill of students for their future, so that can be produced competences to solve problems and think innovatively (Wu & Wu, 2020).

Here is the evidence of the relevant researches about *project-based blended learning*. First, Taufiq, Wijayanti, & Yanitama, (2020) explained that the use of *project-based blended learning* for analyzing critical thinking competencies for candidates of science teachers in astronomy subjects integrated with Moodle LMS can improve the students' critical thinking after completing the project. Then, Nurbekova et al, (2020) showed that utilizing *project-based blended learning* has a big influence on IT students in developing mobile apps like project-based technology, programming, teamwork, and the use of digital for learning content. Through this method, students can create some phone apps so that they have high skill and motivation. Next, Plank & Neimann, (2020) informed that the users of *project-based blended learning* can help students in 6 universities in German for actualizing online teaching in terms of study UE about aboard. The students can work in a group for finishing the project, having discussions, and presentation. This method represents innovative character on the subject, creates an active learning process and produce flexible learning.

The effect of the Covid-19 pandemic, many schools and universities apply distancing learning, so that the actualization of online research use the Virtual Sincronous method. The virtual synchronous method is a type of distancing learning which is focused on online modus where students share and meet together virtually through an audiocassette, videocassette, meeting chat, voice note in social media, e-mail or print out (Anwar, 2018).

Research methods

The research used the true experimental quantitative research because the sample was got randomly divided into two groups, the experimental class, and the control class. Quantitative research has a surplus of objectivity. The research design used pretest-posttest control design, in this study, subjects were divided into two groups: the experimental class and control class. The treatment given to the experimental group is the use of *project-based blended learning* while the control group used virtual synchronous learning. The population in this study were 107 students. The sampling technique in the study used cluster random sampling because of the very large number of populations then it was randomly divided into classes or groups. With the existence of a very large total population, the sample was taken from two classes of 72 students, each of which was a group of 36 students, and the remaining 35 students as a class for the test instrument test (trial). In this study, the data collection technique was through the test, namely the pretest and posttest by giving 30 questions in the form of multiple-choice questions in the experimental class and control class each. Through this test, students can see the results of the initial and final abilities.

Results and Discussion

Before distributing the test in the control and experimental classes, the test instrument was tried in the try-out class consisting of 35 students who have studied the basic graphic design material. The result of try out was found 51 questions, 25 questions for *pretest*, and 26 questions for *posttest*. To balance the pretest and posttest, there were 10 questions chosen. The reliability test was from score 0,881 for *pretest* and 0.843 for *the posttest* so that it can be concluded the high-reliability score.

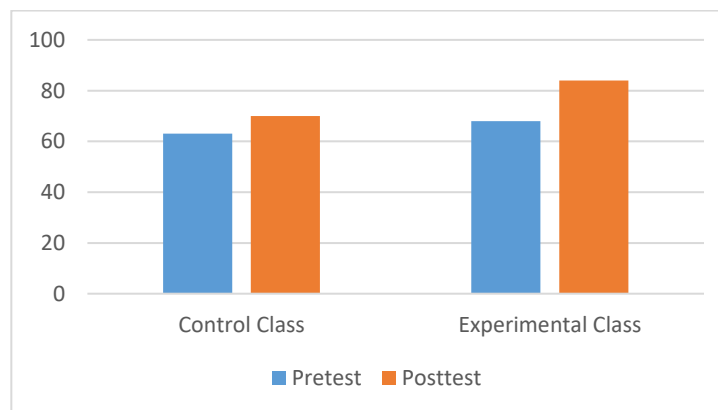
Below was the result of the average score of pretest-posttest:

Table 1. Result of the First Hypothesis Analysis

Variable	Sig. (2-tailed)
Cognitive performances	0,000

Table 2. Result of Average Score of Pretest Posttest

	Learning Outcome
Control <i>Pretest</i>	63,00
Control <i>Posttest</i>	70,00
Eksperimental <i>Pretest</i>	68,00
Eksperimental <i>Posttest</i>	84,00

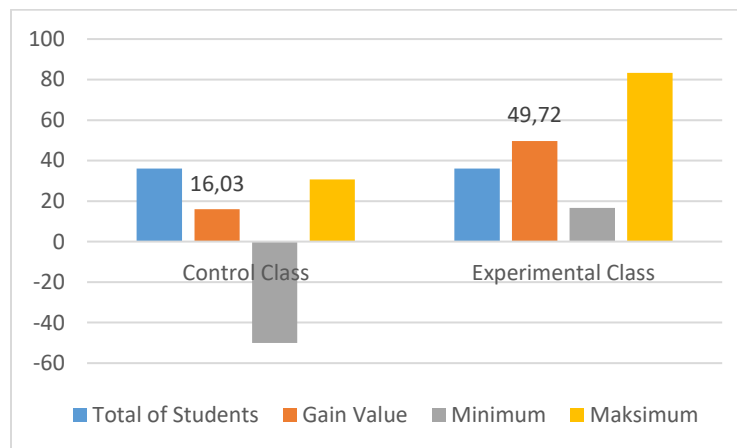
Figure 1. Histogram of Students Achievement

Based on Table 1 the result of the hypothesis test using independent sample t-test in significance 2-tailed was 0,000. It is less than the significance standard ($0,000 < 0,05$). It showed that there were differences in students' outcomes in the experimental class and control class significantly so that h_0 declined and h_1 received. Therefore, there were differences in students' outcomes by using project-based blended learning from the virtual synchronous method.

Based on Table 2 the result of the average score for the Control pretest was 63 and Control posttest was 70, it increases by 7%. While the average score for the Experimental pretest was 68 and the Experimental posttest was 84, it increases 16%. In conclusion, there was found the difference of learning outcome between control class and experimental class so that h_0 declined and h_1 received.

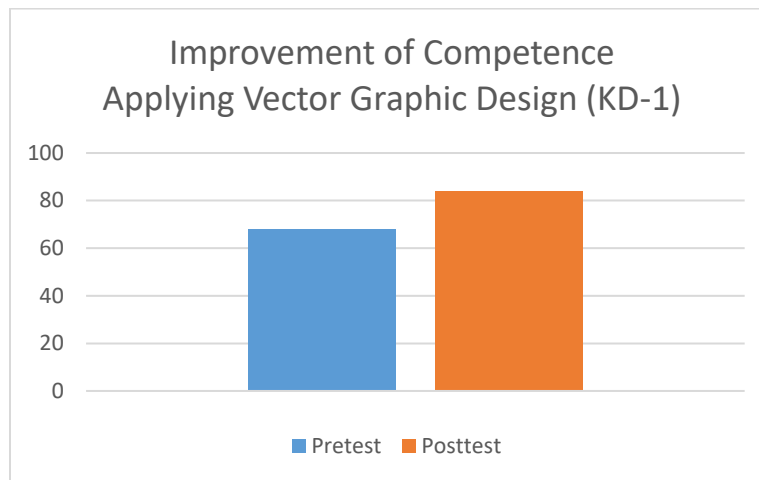
Table 3. Result of the Second Hypothesis Analysis

Variables	Control Class	Experimental Class
Students Total (N)	36	36
Average Score(g)%	16,03	49,72
Minimum Score	-50,00	16,67
Maksimum Score	30,77	83,33

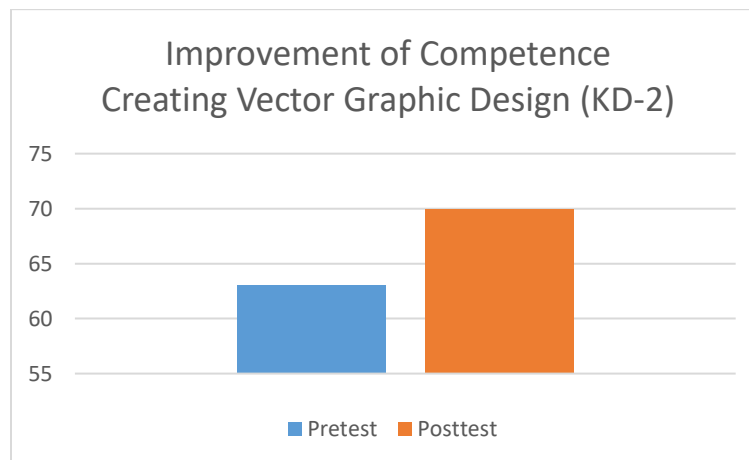
Figure 2. Histogram of Result Gain-Test

Based on Table 3 can be showed that Gain standard value in the Experimental class is more than the control class ($0,49 > 0,16$), there is an improvement so h_0 declined and h_1 received. In conclusion, the effectiveness of the use of Project-Based Blended Learning in the experimental class is higher than the Control class using the virtual synchronous method.

Based on figure 2 Histogram of Result Gain-Test can be analyzed that the gain-test score, minimum score, and maximum score increase significantly. The improvement of the Gain test is 16,03 on the control class become 49,72 on experimental class with 36 students in every class. The minimum score on the control class is -50,00 and 16,67 in the experimental class. The maximum score on the control class is 30,77 and 83,33 on the experimental class.

Figure 3. Histogram of Improvement of The first Basic Competence

Based on figure 3 Histogram of Improvement of The first Basic Competence can be showed that study in the first competence test about applying the basic graphic design on vector increases. It is proven by the result of the test before and after *project-based blended learning* applied. Here, the students introduce about types of tool in Corel Draw application and the use to design vector.

Figure 4. Histogram of Improvement of the Second Basic Competence

Based on figure 4 histogram of improvement on the second basic competence can be showed that study in the second competence test about making the vector-based graphic design increases. It is proven by the result of the test before and after *project-based blended learning* applied. Here, the students create a logo and banner creatively and edit design using the tool in Corel draw.

Based on the result of hypothesis analysis and explanation above can be concluded that there is a difference in student's achievement in applying Project-Based Blended Learning conducting from the Virtual Sincronous method. The use of Project-Based Blended Learning is more effective than the Virtual Sincronous method based on the result of pretest and posttest in the experimental and control class.

This study is supported by the statement that Project Based Learning shows the learning process where students can do the authentic project and developing products. The result strengthens that project-based learning has a positive influence on students'achievement. The project-Based Learning method can improve

cognitive performances, students' skills, and motivation for collaboration, and negotiation in teamwork and motivation increases better (Guo, Saab, Post, & Admiraal, 2020).

The project-based blended learning model is conducted for finishing the project designed as the industry need which uses learning applications as media. The application can be used by teachers to observe the student's project. It is also used to have discussions solving some problems faced by students during the learning process. By giving the project to the students, it can support the students' skill in term of problem-solving and doing simple design (Saputra, 2019).

The use of *project-based blended learning* can stimulate students for doing the simple into the complex project so that their passion and motivation increase (Nurbekova et al., 2020). The case shows that *project-based blended learning* is more effective to improve practical competences, independent study, curiosity, and teamwork motivation for students (Tong, Kinshuk, & Wei, 2020). Applying *project-based blended learning* can support critical thinking after doing a project (Taufiq et al., 2020).

Based on all previous data analyses, the result of this study show that both classes use online learning with a different method. The experimental class uses the Project-Based Blended Learning method which is suitable for the curriculum for SMK integrated with LMS Schoology. Here, all steps of the learning process used Schoology from identifying problems, discussion, teamwork, or group for project, design logo and banner, monitoring the student's work until evaluation or test after project. The students also practice creating online design with Gravit Designer easily. While the learning process in the control class is also based on online learning where teacher shared materials in form of video through Whatsapp, Messenger without project assignment, and the last test was modified through a google form.

In the control class, students got materials without self-practice by project and it didn't integrate with LMS so that no skill improved. The materials in some videos do not attract all students well. However, in experimental class uses Schoology and a chance for upgrading self-competence to have practiced the online design using Gravit Designer and Corel draw. The existence of LMS Schoology can persuade the students to be more active in the learning process.

Conclusion

Based on the results of testing the first hypothesis using the independent sample t-test with the results of the pretest and posttest values, it is known that there are differences in learning outcomes between the use of the Project-Based Blended Learning model and the Synchronous Virtual method. The difference in learning outcomes is obtained from research data in the experimental class using the model Project-Based Blended Learning with a control class using the Virtual Synchronous method. And based on the results of testing the second hypothesis with the Gain test there is an increase in student learning outcomes and has high effectiveness using the Project-Based Blended Learning model compared to the Synchronous Virtual method. Based on the results of the pretest and posttest mean scores of the experimental and control classes. So, it can be concluded that the increase in learning outcomes using the Project-Based Blended Learning model is higher than the Virtual Synchronous method.

Suggestion

For further researchers, it can expand and multiply the scope of material and variables. In addition, researchers are able to develop other platforms that are more effective and set the right time for the use of project-based learning.

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