The Differences of Student's Learning Outcomes and Instructional Interactions between Project Based Learning and Problem Based Learning Methods by Using Web Based Learning Technique in the Course of Videography

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Abstract. Learning activities during the COVID-19 pandemic has been making students become less active than before the pandemic, and their learning outcomes somehow become less optimal. This phenomenon tends to happen because the teachers only deliver the course material briefly then give assignments to students in the end of online class session. Therefore, this present study aimed to analyze the differences of students' learning outcomes and instructional interaction on the course of Videography by applying the method differences of PjBL with PBL. This present study applied Quasi Experiment research method by using Nonequivalent Control Group Design. The subject of this present study involved students of grade XI from department of Visual Communication Design, *SMK Negeri 1 Purwosari*. Hence, its research sample was categorized as population member since there was only one group within the class of DKV Department. Furthermore, the data collection techniques included questionnaire non test of instructional interaction and test results of learning questions pre-test and post-test. This present study also applied independent t test as the data analyzing technique. Eventually, the results showed that PjBL method was more appropriate in term of learning outcomes than PBL method in which it was evidenced with the hypothesis test result was less than significant level of 0.05. Additionally, PBL was more appropriate in term of instructional interaction than PjBL method that was showed by hypothesis test result which was less than significant level of 0.05.

Keywords: Learning Outcomes, Instructional Interactions, Project Based Learning, Problem Based Learning, Web Based Learning, Videography, Vocational High School

1 Introduction

Videography is a productive discipline in the XI grade of visual communication design at *SMKN 1 Purwosari*. In teaching and learning activities in the course of videography, students tend not to provide feedback during teaching and learning activities. Students' learning outcomes are also not optimal because of the tendency of teachers to provide course materials and then give assignments asynchronously through google classrooms without any further understanding. Learning outcomes can be influenced by two factors, i.e. internal factors (factors that come from within the

individual) and external factors (factors that occurred from the individual's environment).

One example of external factors is school factors such as the tendency of teachers in delivering courses material without using other innovative learning methods. The solution that can be applied is by implementing innovative learning methods such as the PjBL and the PBL methods. Both learning methods are suited to the standard of 2013 Curriculum.

Based on the results of interviews with teachers and observations proved that there was only one class group in the XI grade of visual communication design department. Then the group was divided into two groups i.e. the experimental group and the control group. Researchers would apply PjBL for the experimental group and PBL for the control group by utilizing web based learning using a combination of synchronous and asynchronous mechanisms. This present study used google classroom, google form, whatsapp for asynchronous learning and google meet for synchronous learning.

2   Literature Review

Innovative learning methods would certainly affect learning outcomes and instructional interactions of students. Learning outcomes is the capability of students after carried out the process of teaching and learning activities. We can observe some changes in student behavior [1]. These changes can be seen in the increased abilities, knowledge, habits, the way of thinking, and others. Learning outcomes is a process when there is an interaction between educators and students [2]. Basically, humans are social creatures that require them to interact with other people. Interaction can be mentioned as a correlation, influence, action carried out by humans in various situations and conditions. In the learning process there is an interaction between educators and students which is called instructional interaction. Reciprocally, a research on instructional interactions resulted that educational interactions between educators and students bring out positive connections to student enthusiasm in learning [3]. Instructional interaction is a process of interaction that is carried out deliberately with the aim of guiding students to be more mature [4].

Project based learning is very appropriate when it is implemented in vocational high school (SMK) in a productive learning program because it does not only apply competency-based learning but also implements production-based learning and has a product orientation [5]. Project based learning will automatically spur students to make independent interpretations in order to get meaningful learning outcomes [6]. Syntax of project based learning method based on Ministry of Education and Culture, method steps of project based learning consists of: determining the basic questions, preparing the stages of project work, organizing the project agenda, completing the project through facilities and supervision of educators, presenting the project, and conducting the evaluation process [7].

Problem based learning is a learning method based on motivation to solve problems [8]. Meanwhile the implementation of PBL in vocational high school in the practical learning process is able to increase students' interest and students' practical abilities [9]. The steps of the PBL method initially convey an orientation about the problem, secondly is organizing students, third i.e. guiding and investigating, fourth is elaborating and presenting work products, and finally analyzing and evaluating the process of overcoming problems [10].

Web based learning is a learning activity that is carried out by using a website or online learning because web based learning contains online content and it requires

technological tools such as internet access [11]. Some activities that can be done such as conducting discussions, video conferencing, or doing video streaming. There are two mechanisms for using web based learning, i.e. synchronous and asynchronous mechanisms. Synchronous mechanism is a mechanism that is directly connected between educators and students online within a predetermined time while the asynchronous method is flexible with time. Synchronous mechanism is real time communication, while asynchronous mechanism is delayed time communication.

Videography comes from the words video and graphics. The meaning of the word video is a camera device that involves the sense of hearing and the sense of sight. The meaning of graphics is the arrangement of the image layout so that it can provide meaning to the viewer. Broadly speaking, videography is the study of image layout through video camera techniques. Videography is a discipline that studies a series of events or images from planning, recording, and editing [12].

The similar research obtained a research result that the use of PjBL is better than PBL in terms of student learning outcomes [13]. Likewise, the other research resulted the decision that there is a variation in learning outcomes of the PjBL method with PBL, i.e. the mean value of student learning outcomes using PjBL is more accurate [14]. Moreover, the other research found that problem based learning performed a better level of student effectiveness than project based learning with a higher percentage of problem-based learning class average activeness with a percentage number of 57% and 48% in project based learning [15]. Nevertheless, this present study would like to discuss the differences in learning outcomes and instructional interactions by implementing project based learning methods with problem based learning.

2   Method

This present study was successfully done at which was located at Jalan Ngambon, Pojok Village, Purwosari District, Bojonegoro Regency, East Java Province. The subjects of this present study were all students of grade XI majoring in visual communication design in the course of videography. The research process was described into the following figure.

Fig. 1. describes the steps of research. At the first step, researcher determining the location and time of the research in which it was at *SMKN 1 Purwosari*. In addition, the researcher also determined the time for the implementation of the PjBL learning method experiment for the experimental group and PBL for the control group on November 17, 2020. The next step is determining the population and sample. Determination of the population was done by involving all students of grade XI majoring in Visual Communication Design (Henceforth be mentioned as VCD). The sample used in this was all students of grade XI majoring in VCD. Researchers applied a saturated sampling technique because it involved all members of the population to be sampled. This was done because the number of students was only 36. The researcher also used systematic sampling to divide the group by using the attendance number 1-18 became the experimental group by getting treatment of the project based learning method and the presence number of 19-36 became the control group by receiving the problem based learning method.
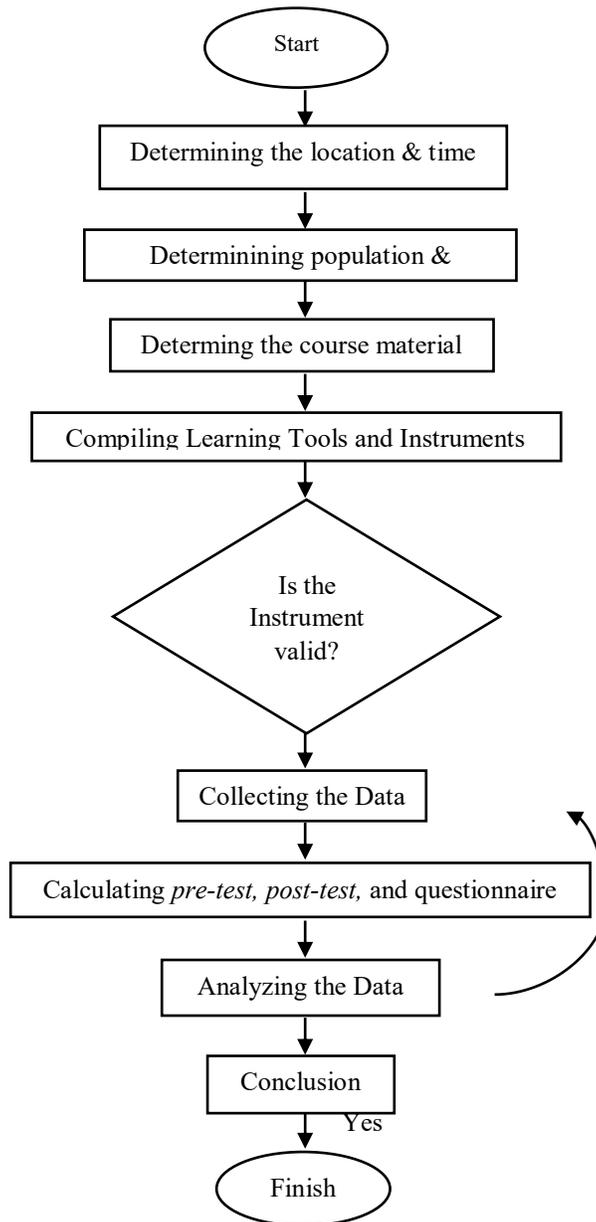
Fig. 1. Steps of the research

The next stage was to determine the course material. Researcher chose course material in accordance with the basic competency 3.3 regarding the application of procedure for making storyboards and basic competency 4.3 regarding storyboarding. Researcher used these basic competencies by considering several factors, i.e. firstly when students were given projects such as making videos, students were still not optimally working on it because of economic conditions such as not having an extra quota. Besides, the second factor was related to the facilities and infrastructure of

students at home. Researchers performed the course material through power points in google meet. In addition, researcher also utilized google classroom and WhatsApp media to provide information related to the learning process.

The next step was to compile the tools and instruments. Researcher compiled two kinds of Lesson Plans used for teaching and learning activities between the experimental group and the control group. Furthermore, researchers also prepared google classroom, google meet and other alternative applications for research implementation. The researcher prepared several instruments to collect data such as pre-test, post-test, and questionnaire. The questions used were in the form of multiple choice and elaborations. Meanwhile, the questionnaire had four choices consisting of responses Strongly Disagree (SD), Disagree (D), Agree (A), and Strongly Agree (SA).

The next step was to validate the instrument, whether the instrument was valid or not. If it was valid, the researcher would proceed to the next stage yet if it was not valid, then it would return to the process of compiling learning tools and instruments. The instrument was validated by the expert to provide an assessment of the appropriateness of the instrument before it was applied to the research. After getting the validation value, the researcher must improve the instrument according to the validator's suggestion. Then the researchers calculated and analyzed the validation value of the instrument. If the results of the instrument validation were valid and reliable, the researcher could implement the instrument.

The next step was collecting the data by doing the Lesson Plans that already prepared formerly. Learning outcomes were obtained through students' pre-test and post-test and instructional interactions derived from questionnaires that had been filled in by students. The next stage was calculating the test and non test scores in the form of tests done before the PjBL or PBL treatment as well as tests that were held after the PjBL or PBL treatment and also calculating the results of the questionnaire for the experimental group and the control group.

The next step was that the researcher performed data analysis by using descriptive statistics to obtain the average, mean, and median number; variance; and standard deviation or the square of the variance value from the test and questionnaire results in the process of calculation. When the data was analyzed, in order to find out the calculation numbers, it was necessary to pay attention to whether the next step used parametric or nonparametric statistics. Before determining whether to use parametric statistics or nonparametric statistics, the researcher must firstly give a normality test. If the data was normal, then the data analysis process could be continued by using parametric statistics. This present study applied independent t test as a hypothesis test. Yet, before holding the independent t test, researcher was required to perform homogeneity test. If the data was normally and similarly distributed, it could be continued to have the parametric statistical test process through independent t test. This study used the Fisher or f test to calculate the homogeneity test, and the Saphiro Wilk test to calculate the normality test. The last step was to make conclusions over the results of the differences analysis of learning outcomes and instructional interactions between the PjBL and PBL methods that used web based learning techniques.

This present study applied quasi experiment method with a research design of nonequivalent control group design. The reason to choose this method was that quasi experiment overall did not have the discretion of manipulating the object. This present study used that research design because before and after the treatment, students would

be given a number of questions that have been formulated previously in the test instrument which would be analyzed later. Additionally, the research design was chosen because the researcher used a saturated sampling technique, which meant that all members of the population were used as samples so that the sampling was nonrandom (Febrinata, 2014). The researcher divided the class became two big groups i.e. experiment group and control group.

The research design of nonequivalent control group design could be seen in Table 1.

Table 1. Research design

Group	Pre-test	Treatment	Post-Test
Experimental	O_1	X	O_2
Control	O_3	X	O_4

The use of quasi experiment with nonequivalent control group design were chosen because the limited time and space during conducting this present study. The implementation of this research had a correlation with teaching and learning activities that was done online. The experimental group and the control group were obtained by dividing a presence number. The presence number of 1-18 got project based learning treatment and became experimental group, while the presence number of 19-36 got problem based learning treatment and became control group.

3   Result and Discussion

3.1 Students's Characteristics

The research location was at *SMKN 1 Purwosari*, located at Jalan Ngambon, Pojok Village, Purwosari District, Bojonegoro Regency, East Java Province. The research subjects were students of grade XI majoring in visual communication design in the course of videography. This present study only involved one class of visual communication design department because SMK Negeri 1 Purwosari had only one class of study groups. *SMKN 1 Purwosari* had several departments including technic engineering, automotive engineering, software engineering, accountancy, visual communication design, and welding engineering. The research was conducted in grade XI, majoring in visual communication design, in the course of videography with the experiment implementation time on November 17, 2020 by using synchronous and asynchronous learning mechanisms. The number of students in the visual communication design department was 36 students so that the determination of the experimental group and the control group took systematic sampling by using the attendance number. The results of the interview with the teacher explained that the learning outcomes of students of visual communication design department were not optimal and there was no feedback given by students during the learning process.

3.2   Other Factors in the Research

In this research, there are several factors that can indirectly influence the data research. For example, the method and the research design, the research instrument, and the learning process. This research employs Quasi Experiment with systematic sampling as the sampling technique.

The researcher could not determine which group that is suitable with both project-based learning and problem based learning. Due to a limited number of Visual Communication and Design's classes, the researcher then divided those classes into two groups.

The researcher has prepared few instruments and lesson plans such as interview instrument, observation, questionnaires, and both pre and post-test. The researcher has also arranged various learning tools, namely the lesson plans (RPP), Google Classroom, Google Meet, Zoom, and Google Form. In addition, the learning sessions were conducted by combining synchronous and asynchronous mechanisms. Accordingly, the synchronous session was carried through within 30 minutes in consideration to the learning facilities owned by the students. Meanwhile, the next factor is tightly related to this research's implementation, referring to when the research is done in the same day (November 17th 2020), with project based learning group from 12.45 to 13.15, and from 13.15 to 13.45 for problem based learning. From the implementation of both project based learning and problem based learning, the researcher finally obtained the results of the pre and post-test and the questionnaires.

Lastly, the last factor has something to do with the learning process, of which the difference between project based and problem based learning depends on the skill in the learning process itself. In problem based learning group, the students were required to write a script based on the issues previously identified by the students. On the other hand, the students from project based learning group were asked to write a script along with the storyboard from the newly found problems as the students observed.

3.3 Hypothesis Test of Research Data

The results obtained in the form of test instruments (pre-test and post-test) and questionnaires. After getting the results of the research, the next step was to analyze the data. One of the steps in analyzing the data was to test the research hypothesis. The purpose of testing the hypothesis was to get answers over the problem formulations that had been previously created. The answer to the first problem formulation was that the researcher would calculate the hypothesis test by using data of the experimental group pre-test and the control group's pre-test, as well as the experimental group's post-test and the control group post-test. The second problem formulation was to test the hypothesis through the questionnaire data pair of the experimental group and the control group.

The testing of Hypothesis could be done when the normality and homogeneity tests had been hold beforehand. The result of normality test was done by using the Saphiro Wilk test which showed that all data were normally distributed consisting of the experimental and control group pre-test, post-test, and its questionnaires. Withal, the homogeneity test using fisher test resulted several points, including experimental and homogenous control group pre-test, post-test, and questionnaires. The prerequisite test results showed that all data were normal and homogeneous so that it could determine the use of parametric statistics using the independent t test.

3.3.1   Independent T Test of the Research Data

The independent t test was applied as a calculation in creating a hypothesis test of research data that was independent or unpaired. This test was used to prove the significance difference between the two groups. This test was carried out in order to find out the differences in the implementation of experiment between the experimental and control group in which each of them receiving differ treatments i.e. the experimental group with the PjBL method and the control group with PBL method to know students' learning outcomes and instructional interactions. The pairs of data

groups from the independent t test hypothesis were the pre-test, post-test, and questionnaire scores of experimental and control groups.

Table 2. Test results of independent t test

No.	Data	Test Results	Inferences
1	Pre-test of experimental and control groups	T count = 0.128 T table = 1.691 T count < T table	H_0 failed to be rejected
2	Post-test of experimental and control groups	T count = 0.245 T table = 1.694 T count < T table	H_0 failed to be rejected
3	Questionnaire of experimental and control groups	T count = 0.418 T table = 1.692 T count < T table	H_0 failed to be rejected

Hypothesis test results of experimental and control group pre-test were t value of 0.128 with the t table of 1.691. Accordingly, this proved that the value of t table is higher than t count which meant the nil hypothesis failed to be rejected. This hypothesis also proved that the pre-test score of the experimental group was better than the control group. The purpose of testing with this pair of data was to determine if there was a difference in the students' learning outcomes before applying the PjBL and PBL methods. Retrieval of data was taken from different groups so that it used the independent t test on parametric statistics. The conclusion of the test results was that students' learning outcomes were different before the learning that applied PjBL and PBL methods.

Hypothesis test results of experimental and control group post-test were t value of 0.245 with the t table of 1.694. Accordingly, this proved that the value of t table is higher than t count which meant the nil hypothesis failed to be rejected. This hypothesis showed that the value of experimental group post-test was higher than the control group. The purpose of testing with this pair of data was to determine if there was a difference in the students' learning outcomes after applying the PjBL and PBL methods. Retrieval of data was taken from different groups so that it used the independent t test on parametric statistics. The conclusion of the test results was that students' learning outcomes were different after the learning that applied PjBL and PBL methods.

Hypothesis test results of experimental and control group questionnaire were t value of 0.418 with the t table of 1.692. Accordingly, this proved that the value of t table is higher than t count which meant the H_0 hypothesis failed to be rejected. This hypothesis also proved that the questionnaire score of the control group was better than the experimental group. The purpose of testing with this pair questionnaire of both experimental and control groups was to know the result differences of instructional interactions during the applying the PjBL and PBL methods. Retrieval of data was taken from different groups so that it used the independent t test on parametric statistics. The conclusion of the test results was that the instructional interactions that happened during the learning process was different after PjBL or PBL methods were applied.

3.3.2   Discussion of Hypothesis Test Result

The results of this present study showed that the learning students' outcomes of the group that received PjBL treatment (experimental group) were good, whereas the group that received PBL treatment (control group) was good in the results of instructional interactions. So, the positive research results surely could be considered in holding the learning process during COVID-19 pandemic. The learning outcomes of students who

received project based learning treatment on the post-test were with an average value of 64.64. Meanwhile, students who received problem-based learning received an average post-test score of 60.41. Then, the results of the instructional interaction questionnaire of the experimental group who received the project based learning method received an average value of 43.76. In addition, the control group that received the PBL method received an average value of 44. Descriptively, it could be inferred that students' learning outcomes who received PjBL treatment had higher scores than students who were treated with problem based learning methods. Moreover, it also indicated descriptively that the results of instructional interaction questionnaire of students who received the PBL method were higher than students who received the project based learning method. In addition to being viewed from the descriptive statistical analysis, based on the hypothesis test it showed that the value of students' learning outcomes who get PjBL treatment had a higher value as evidenced by the t table value was higher than t value that used a significant level of 0.05. Furthermore, based on hypothesis testing, the results of students' instructional interaction questionnaire who received PBL were better than those of PjBL. This could be proven by using a significant level of 0.05 with the result of t table was higher than t count.

Similar research had also been done by Safitri. The hypothesis of this study is about the ability to think creatively which can be influenced by the learning model and the average difference in the ability to think creatively in the PjBL method with PBL [1]. The descriptive conclusion of the research was that regarding the ability of students to think creatively, the highest average value was obtained by using the project based learning method [1]. Similar research on instructional interactions had also been conducted by Aziz. The objective of this study was to determine the correlation of instructional interaction between teachers and students towards students' learning motivation. The conclusion of this study is that educational interactions between educators and students had a positive and significant correlation towards students' learning motivation [3].

Learning outcomes differences by implementing the PjBL and PBL methods [14]. The results of hypothesis testing showed that there were differences between the first class receiving PBL treatment and the second class receiving PjBL treatment towards student learning outcomes. The difference was that the average value of the second class receiving PjBL treatment was better than the first class receiving PBL treatment [14].

The motivation of students in teaching and learning activities would indirectly affect the quality of teaching and learning process, one of which could be seen through the learning outcomes. Similar research had also been conducted by Indrawan. The aim of this study was to found the differences of students' activeness through PBL and PjBL learning models. The research hypothesis was that there was a difference of students' activeness in the field of economics when the PBL and PjBL models were applied. The results of this study proved that the group who received PBL treatment would get better students' effectiveness than students who received PjBL treatment in the discipline of economics [15].

4 Conclusion and Suggestion

4.1 Conclusion

Learning outcomes in videography subject was better using the project based learning method than problem based learning. The results of the t table are greater (1.691) than t arithmetic (0.128) so the learning outcomes of the experimental

group used the project based learning method are better. Meanwhile, the result of instructional interaction between project based learning and problem based learning methods was better to apply problem based learning method. These results are based on the results of the t table (1.692) greater than t arithmetic (0.418) so the control group that applied the problem based learning method was better in terms of instructional interaction than the project based learning method

4.2 Suggestion

This research recommends that further research could be focused at difference synchronous and asynchronous mechanisms when applied learning method between project based learning and problem based learning. Further researchers can find out learning outcomes, instructional interaction by applying synchronous and asynchronous learning. In addition, researchers can find out student's motivation when applying project based learning or problem based learning methods.

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