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ONLINE POST-PANDEMIC IN VOCATIONAL HIGH SCHOOL: STUDY ON APPLICATION OF PROJECT BASED LEARNING MODEL INTEGRATED BLENDED LEARNING METHOD

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Abstract

The Project Based Learning (PjBL) model is an active learning that links technology with everyday life by carrying out project activities and producing a work. This study discusses the application of the PjBL model through the online blended method in simulation and digital communication subjects in the Computer and Network Engineering (TKJ) expertise program. The aim is to determine the effectiveness, creativity, and learning activities of the integrated online blended offline PjBL model implementation. The research method used is a quasi-experimental method with a non-equivalent pretest-posttest design. The population in this study were grade X students of the TKJ skill program at SMKN 4 Gowa, South Sulawesi. The sampling technique used was purposive sampling, namely the experimental group and the control group consisting of two groups. Data collection uses instruments in the form of questionnaires, tests and observations, which are validated through expert judgment validators. The results of the study can be concluded that the application of the integrated PjBK model of the blended learning method is effective in improving learning outcomes, learning activities and creativity during the learning process.

Keywords: PjBL Model, Blended Learning Method, Effectiveness, Activities, Creativity

1. INTRODUCTION

The pandemic brought rapid changes in various fields of life, including education, thus forcing everyone to learn adaptively, one of which is through digital technology instruments. There is an extraordinary acceleration in the use of digital technology in education during the pandemic. For this reason, technology was appointed as one of the priority issues in the 2022 G20 on Education and Culture forum. Although it has undergone changes, in general what is improved is only thinking about how to improve the learning achievement of students, which sometimes will hinder a student from developing activities and even creativity to be competent in the preferred field.

Activities and creativity of students are hampered not because of one system alone, but there are several factors that must be considered. What is very dominant in hindering the development of students' activities and creativity is an impressive learning style called the teaching method to educators which is carried out by most educators. Creativity can involve finding new and better ways of doing things. In a broader sense, creativity is related to the use of various potentials possessed, both knowledge, intuition and imagination in such a way that it can produce new ideas that are better and more useful.

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According to Soesilo Danny (2017), creativity is a basic part of human endeavor, supported by Ramdani et al (2019) creativity is an important aspect in building a good educational culture. Good creativity is indicated by learning outcomes that do not only focus on improving cognitive abilities but also in problem solving skills process. Even according to Birgili (2015) in PjBL students are required to actively participate in creating innovative solutions to problems through their experiences.

Student activities can be increased through PjBL learning. Because PjBL makes it easy for students to understand and solve problems in everyday life. Learning will create projects and activities, and increase activity. This activity will have an impact on understanding concepts, creative thinking and will bring up critical thinking and produce products in solving existing problems (Cofré et al. 2019).

PjBL is a model recommended by the Minister of Education and Culture in implementing blended learning during the Covid-19 pandemic. However, there are some findings regarding the obstacles experienced in the implementation of PjBL during the pandemic, including: signals and human resources for educators and students who lack technology. According to Muskania, R.T & Wilujeng, I. (2017), PjBL is active learning that relates technology to everyday life by carrying out project activities and producing a work. Through PjBL students are involved independently in an effort to improve thinking power, think critically about the things that are done with the problems that are found by students.

Therefore, through project learning, students get the opportunity to design assignments and retrieve information to be implemented in everyday life. Project learning helps students gain experience, knowledge, skills and attitudes. The application of learning through online and offline media must be able to present a pleasant learning atmosphere accompanied by clear steps and instructions so as not to confuse the learning process. According to Lin, M. H., & Chen, H. G. (2017), the readiness of educators who master technology and information, are able to collaborate and apply online and offline media, must be improved. Through education, training and mentoring, teachers are able to create and develop fun digital learning resources as a new way of learning to accelerate the achievement of learning goals and produce quality, competent, independent and creative student outputs (Fatmawati, 2021).

Actually, there are many platforms and a variety of learning technologies that can be used by students and educators, according to their learning needs. All can take advantage of existing or available digital technology-based learning resources or develop their own specifically (Meika & Sujana, 2017).

Based on several theories about the PjBL model, it is concluded that the PjBL model is a constructive model, has the potential to empower high-level cognitive abilities, which can encourage students to increase creativity and activity in independent learning activities using both offline and online media. Therefore, this article discusses the use of the PjBL Model through blended offline and online methods to determine the effectiveness, creativity and activities.

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2. METHODS

The research method used is a quasi-experimental method with a non-equivalent pre-test-post-test design. The population of this research is the students of class X TKJ expertise program at SMKN 4 Gowa, South Sulawesi. The sampling technique used purposive sampling, namely the experimental group and the control group consisting of 34 students. Data was collected using instruments in the form of questionnaires, tests and observations, which were validated through expert judgment validators.

The experimental group in class A uses online blended teaching and learning process (PBM) and is treated with the PjBL approach syntax, while the control group in class B only uses offline blended PBM. Treatment was carried out in each group, then pre-test and post-test were carried out. The value of the test results is calculated by calculating the gain score according to C. Edward (2005). The N-Gain test is used to measure how much improvement in learning outcomes after PBM.

Data analysis techniques using analysis; (a) descriptive, aims to describe learning outcomes, creativity and learning activities; (b) validity to validate the instrument. Data was collected using instruments in the form of questionnaires, tests and observations, which were validated through expert judgment validators.

The criterion for the validity of the test item instrument is if r count < r Table, then the instrument item is said to be invalid, on the contrary if r count > r Table, then the instrument item is said to be valid. To determine the feasibility of the instrument, the validity category refers to the theory Moleong, L. (2017) as shown in Table 2.1;

Table 2.1. Validity Criteria

Criteria Validity	Interval
Invalid	$1{,}0 \leq X, < 1{,}5$
Quite Valid	$1{,}5 \leq X, < 2{,}5$
Valid	$2{,}5 \leq X, < 3{,}5$
Very Valid	$3{,}5 \leq X, < 4$

Source: Moleong, L. (2017)

Furthermore, giving categories to determine the qualifications of the pre-test and post-test scores of learning outcomes. The criteria for learning outcomes are divided into 4 categories according to Moleong, L. (2017) which are stated in Table 2.2 below;

Table 2.2. Assessment criteria

Criteria	Score
Very high	$89\% < X \leq 100\%$
Tall,	$78\% < X \leq 89\%$
Currently,	$64\% < X \leq 78\%$
Low	$55\% < X \leq 64\%$

Source: Moleong L. (2017)

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3. FINDINGS AND DISCUSSION

a. Findings

All research instruments were validated through the judgment validator test, to three experts in their field by showing the initial design of the instrument, then it was revised and used as a suitable instrument for data collection, a summary of the results can be seen in Table 3.1 below:

Table 3.1 Summary of Instrument Validation Results.

No	Instrument	Item quantity	Mean Score	Categories
1	Pre-test dan Post-test	15	3,4	Valid
2	creativity and activities	15	3,5	Very Valid

1. Description of Data Analysis of Pre-test and Post-test Results

The results of the pre-test data analysis were obtained from the test sheets distributed before the online blended PBM. Data analysis of student test results in Control Class B can be seen in Table 3.2 below:

Table 3.2 Results of Pre-test Data Analysis Control Class B

Measures of Central Tendency and Dispersion	Data
Number of samples (N) Valid	32
Average (Mean)	64,791
Standard Deviation (Std. Error of Mean)	25,014
Median	63,33
Mode	93,33
Variance	625,78
Minimum	26,67
Maximum	100,00

Class B Control pre-test results were obtained from the test sheets given to 32 students. Based on data analysis in Table 3.2, the lowest pre-test value is 26.67 and the highest is 100, so the highest and largest range values are 73.33. The mean value is 64.79 and the median value is 63.33.

Table 3.3 Results of Post-test Data Analysis Control Class B

Measures of Central Tendency and Dispersion	Data
Number of samples (N) valid	32
Average (Mean)	60,195
Standard Deviation (Std. Error of Mean)	4,680
Median	56,665
Mode	40,00
Variance	744,715
Minimum	20,00
Maximum	100.00

Table 3.3. Shows the results of posttest data analysis obtained from randomized question sheets, distributed after the PBM is blended online. The test results data for those who worked

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on the test sheets in Class B Control were given to 32 students, after the PBM was blended online. Based on the data analysis in Table 3.3, the lowest post-test score for Class B Control is 20 and the highest is 100 with an average score of 60,195.

Table 3.4 Results of Pre-test Data Analysis Experimental Class A

Measures of Central Tendency and Dispersion	Data
Number of samples (N) Valid	34
Average (Mean)	60.195
Standard Deviation (Std. Error of Mean)	4.680
Median	56.665
Mode	40.00
Variance	744.715
Minimum	20.00
Maximum	100.00

The results of data analysis are shown in Table 3.4 with the experimental Class A pretest scores obtained from 34 students, using offline blended PBM, the lowest is 20 and the highest is 100 so that the mean value is 60,195, the median value is 56.665.

Table 3.5 Results of Post-test Data Analysis Experimental Class A

Measures of Central Tendency and Dispersion	Data
Number of samples (N)	34
Standard Deviation (Std. Error of Mean)	10.695
Median	80.00
Mode	93.33
Variance	387.901
Minimum	40.00
Maximum	100.00

The results of the post-test data analysis for Class an Experiments were obtained from test sheets given to 34 students, after PBL PBM with the online blended method. Based on the analysis of the data in Table 3.5, the post-test score for Class an Experiments is the lowest 40 and the highest is 100 with an average value of 75,882. After the test result data is analysis, the calculation of the increase in learning outcomes is carried out. According to Corcoran, E. (2005), the N-Gain test is used to measure how much improvement in learning outcomes after PBM. Based on the calculation results, there was an increase in learning outcomes in Class an Experiments by 0.71 which was obtained from the difference between the pre-test and post-test results, then converted into a normalized gain formula (Hake, 1999).

Table 3.6. N-Gain Measurement Distribution

No	N-Gain	Category	Frequency	Percentage (%)
1	$g \leq 0.30$	Low	2	5,88
2	$0.30 < g \leq 0.70$	Medium	13	38,24
3	$g > 0.70$	High	19	55,88
		Total	34	100

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Furthermore, summary of the calculation of the N-Gain value can be seen in Table 3.6, there are 2 students in the Low category, 13 students in the Medium category and 19 students are in the High category. The increase in learning outcomes shows the N-gain is in the High category.

2. Description of the Results of Creativity and Activity Data Analysis

a. Describing the Data from the Analysis of Creativity and Activity Control Class B

Table 3.6 Results of Creativity and Activity Data Analysis Control Class B

Size Item	Learning meeting Data				
	I	II	III	IV	V
Number of samples (N)	32	32	32	32	32
Standard Deviation (Std. Error of Mean)	2.90	2.91	2.89	2.86	2.94
Median	0.469	0.409	0.398	0.477	0.501
Mode	2.83	2.83	2.83	2.83	3.00
Variance	2.75	2.75	2.75	2.83	3.00
Minimum	2.25	2.17	2.08	2.17	2.17
Maximum	3.75	3.58	3.58	3.75	3.83

Intellectual ability to innovate so that these students can be categorized as having high creativity and activity in PBM. The data from the observations of Creativity and Experimental Class A. Learning activities were obtained from the observation sheet, see Table 3.7 below:

Table 3.7 Results of Creativity and Activity Data Analysis Experimental Class A

Size Item	Learning meeting Data				
	I	II	III	IV	V
Number of samples (N)	34	34	34	34	34
Standard Deviation (Std. Error of Mean)	2.19	2.53	3.02	3.20	3.29
Median	0.465	0.493	0.366	0.336	0.299
Mode	2.33	2.50	3.12	3.17	3.21
Variance	2.67	2.50	.3.25	2.92	3.17
Minimum	1.33	1.58	2.33	2.50	2.75
Maximum	3.00	3.50	3.58	3.83	3.92

Based on Table 3.7 above shows the results of creativity and learning activities K. Experiments in five meetings on the subjects of simulation and digital communication have increased. The increase in the average value is quite significant at each meeting.

b. Discussion

Learning effectiveness is a measure of the success of PBM from a learning interaction process between students and students with educators, in educational situations to achieve learning goals (Kenneth, D., & Syarif, M., 2015). Based on the results of the N-gain analysis in the Experimental group using the PjBK model with the blended learning method, being in the high category indicates that there is an increase in learning outcomes, according to the difference between pre-test and post-test learning outcomes after working on project assignments to design algorithmic program flow in simulation subjects. And digital communication in the TKJ expertise program. This proves that the offline and online blended method can integrate with

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the syntax in the PjBL model, so that it can increase the activeness and creativity of students, to improve learning outcomes. Supported by Wasis (2011) blended learning is learning that integrates offline and online learning as well as various communication options that can be used by teachers and students.

The results showed an increase in the activity and creativity of students so that learning was declared effective because the PjBL model syntax could be integrated with offline and online blended methods, which allowed students to think and learn independently and could even be optimized through a systematic group work process. Supported by Condliffe, B (2016) learning activities are activities or actions, both physical and mental, which are carried out by individuals to build self-knowledge and skills in learning activities. Learning activities will make learning effective. Teachers not only convey knowledge and skills, but teachers must be able to bring students to be active in learning. Learning activities can be created by carrying out fun learning by presenting a variety of learning models that further trigger student activities.

Based on the results data analysis Table 3.7, which shows the results of Grup Experimental activities and creativity in five meetings have increased. The increase in the average value is quite significant at each meeting. The results of this study are supported by the results of research by Utami et al (2018) that after applying the PjBL model there was an increase in student activity and creativity. This shows that the syntax in PjBL can activate and train students to carry out higher-order thinking processes (Muskania, R.T & Wilujeng, I. 2017). Students can be active and creative, empower, hone and develop their thinking skills continuously. According to Choi, Lindquist, & Song (2014), PjBL helps learners develop critical thinking to solve problems in their clinical setting and bridge the gap between theory and practice.

4. CONCLUSION

The conclusion from the results of this study is that the PjBL model becomes a new paradigm after the pandemic experienced by teachers and students. Through the integration of the Blended Offline Online Method, it is effective in increasing creativity and learning activities and becomes a reference in learning prospects in SMK. Supported by Palvia et al., (2018), online learning in SMK has now got its place, not just an additional activity but is predicted to become a mainstream platform.

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