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The Effect of Problem-Based Blended Learning towards Students' Critical and Creative Thinking Skills

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Abstract: The study was aimed at investigating the effect of problem-based blended learning towards students' critical and creative thinking skills in economic learning process. Quantitative method was used as a research design by adapting quasi-experimental model. The study was conducted at SMAN 1 Marga, Tabanan, Bali by involving 43 eleventh-grade students as the research sample in which they were selected by using random sampling technique from the total 312 population. The data were obtained through post-test in which the essay test and performance test were conducted as the data collection technique. The instruments used were essay test and performance test rubric. The obtained data were analyzed descriptive and inferential statistically. ANOVA and MANOVA test were conducted to answer the hypothesis of this study. It was found that; 1) there was an effect of problem-based learning on students' critical thinking skills, 2) there was an effect of problem-based learning on students' creative thinking skills, 3) there was a simultaneous effect of problem-based blended learning towards students' critical and creative thinking skills.

Keywords: Creative Thinking, Critical Thinking, Problem-Based blended Learning.

A. Introduction

The development of technology in industrial era 4.0 leads to the paradigm of 21st century era where the society is demanded to have 21st century skills (Widana, 2017). It brings a great impact towards the education system which is conducted to realize 21st century learning to prepare a competent human resource for the industrial era (Khan et al., 2022). The 21st century skills are required to be emphasized in the teaching and learning process in which the skills are referred to; character, citizenship, collaboration, communication, critical thinking, and creativity (Astuti, 2019; Ariyanto et al., 2020; Kimianti & Prasetyo, 2019). Achieving those skills becoming a characteristic of 21st century learning in which those were implemented through an innovative learning based with a digital approach appearing students-centred learning (Marantika, 2021; Indriyani & Munajah, 2022; Pramesti & Amelia, 2022; Suhono et al., 2023). Therefore, it indicates that the development of technology is along with the education development in which technology is inseparable for conducting a learning process to achieve the 21st century skills.

Critical thinking as one of 21st century skills is commonly emphasized as a fundamental aspect allowing students to overcome unpredictable problem in real life (Masnunah et al., 2022; Oktoviani et al., 2019). Students are led to think logically and dynamically by developing their critical thinking to face the challenge existing in their daily life (Simamora et al., 2020; Sundari & Sarkity, 2021). Critical thinking is also perceived as a skill of connecting various concepts to determine a logic solution used for solving the problem (Andriani et al., 2021; Yusmawati, 2022). Amin et al., (2020) argue that critical thinking is crucial to be developed in the learning process in which it is not only influenced by students' mastery knowledge but environment also gives a contribution towards students' critical thinking development. Students' critical thinking becoming an essential key needs to be developed for preparing them as a compatible individual in solving a real problem.

On another side, students are also encouraged to be creative to solve the issues. Sudirtha et al., (2022) argue that students' creativity needs to be stimulated build them as compatible human resources in the industrial era 4.0. Creativity is recognized as 21st century skills which is frequently established in the learning process influencing students in elaborating their ideas towards a certain issue (Kassi et al., 2021). It is also perceived as a divergent thinking skill related to an individual's ability in developing his or her imaginations, ideas, and feelings (Shoit & Masrukan., 2021). Students' creativity reflects their creative thinking skills in combining their ideas to find out a new concept or produce an innovative product based on the recent issue (Dakabesi & Luoise, 2019; Kartina et al., 2021; Sahwari & Dassucik, 2020). It is such an indication that students' creative thinking skill also plays an important part used for improving students' problem-solving ability.

The establish of critical thinking and creative thinking skill as a reflection of 21st century learning demands teachers to implement the appropriate learning method providing student-centred learning. Providing students-centred learning encourages students' active involvement in which it directly stimulates their critical and creative thinking skills (Amini et al., 2019; Islam et al., 2022). It still becomes a debate in educational field in which the recent issue shows that not all of the teachers can implement an appropriate learning method. Radiah (2022) argues that the learning process in many educational institutions are conducted conventionally which means it is dominated by teacher-centred learning. Students become passive participants where the materials are delivered by using textbooks and lecturing (Zulkarnain, 2019). The learning activities provide less opportunity for the students to actively involve in analysing or evaluating the information delivered by the teachers (Astuti et al., 2021). The inappropriate learning method implementation is an issue that can cause a serious problem towards students' involvement for developing their critical and creative thinking skills.

A relevant problem occurs at SMAN 1 Marga, Tabanan, Bali as what has been found during the preliminary observation. It shows that the learning method conducted at SMAN 1 Marga. The learning process has been conducted by implementing problem-based learning as one of innovative learning method but lecturing still becomes the dominant learning strategies used by the teachers as

facilitator for the students in economic learning process. It is also found that technology is not frequently integrated during the learning process. Students' passive participation can be an obstacle for students to develop their critical and creative thinking skills. Therefore, it is a necessary for the teachers to implement the learning method by innovated it with the integration of technology.

Problem-based blended learning is a new manifestation of innovative learning model which provides students with a problem-based learning conducted through blended learning to stimulate their critical and creative thinking skills (Pitaloka & Suyanto, 2019; Anggaira & Sari, 2023). The integration of technology occurs through the provision of online and offline learning for the students to solve the problem given by the teachers (Könings et al., 2018; Lukitasari et al., 2019; Nurkhin et al., 2020; Ojaleye & Awofala, 2018)(Ali, 2022; Roisatin et al., 2021; Sari et al., 2022). The implementation of problem-based blended learning has been used to improve students' critical and creative thinking skills. It is shown by several previous studies that have been conducted. Primandari and Kesumawati (2020) investigate the implementation of problem-based blended learning in statistic course joined by university students. The investigation reveals that problem-based blended learning improving students' active participations. It is relevant to the finding show that students' active participants are caused by the improvement of their learning motivation influenced by the implementation of problem-based blended learning (Herlina and Sibarani., 2016). It is also supported by another study showing that problem-based blended learning improves students' critical and collaborative skills in solving the problem in mathematic class (Sipahutar, 2022). Those studies prove that problem-based learning brings a significant influence in the learning process.

However, further research still needs to be conducted to investigate the influence of problem-based blended learning towards students' critical and creative thinking skills in economic course particularly at SMAN 1 Marga. It is due to the recent problem found at SMAN 1 Marga related to the implementation of learning method and the recent issue about students' critical and creative thinking skills as 21st century skills. The limitation found in the previous studies considering that there is no study which investigates the effect of problem-based blended learning towards students' critical and creative thinking skills in economic course particularly by involving senior high school students as the research sample. Therefore, this study is conducted to find out the effect of problem-based blended learning towards students' critical and creative thinking skills.

B. Methods

This study used quantitative method as a research design particularly by adapting quasi-experimental method through post-test only control group design. The study was conducted at SMAN 1 Marga, Tabanan, Bali by involving 43 eleventh-grade students who took economic course as the research sample. They were selected by using simple random sampling technique in which they were divided into experiment and control groups. The data were obtained through post-test which was conducted after the treatment (problem-based blended learning) given to the

experimental group. The post-test was conducted in the form of written and performance test. The written test was conducted to obtain students' critical thinking by using essay test as the instrument meanwhile performance test rubric was used to gain students' creative thinking skills data during the performance test. The obtained data were analysed by using inferential statistic method analysis which meant the data were analysed quantitatively. The analysis was conducted through ANOVA and MANOVA test. The perquisite test was conducted before the data were analysed for hypothesis testing to find out the normality and homogeneity of the data. There were three hypotheses tested in this study, such as; 1) there was a significant effect given by problem-based blended learning towards students' critical thinking skills, 2) there was a significant effect given by problem-based blended learning towards students' creative thinking skills, 3) there was a simultaneous effect given by problem-based blended learning towards students' critical and creative thinking skills.

C. Results and Discussion

Result

The analysis was conducted through inferential statistic in which it was assisted by the use of SPSS 22 application. The data were firstly analysed for its normality and homogeneity. The normality test result was presented in table 1, as follow.

Table 1. The Normality Test Result of Obtained Data

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Critical Thinking Skills	Control Group	.248	23	.001	.869	23	.060
	Experimental Group	.227	23	.003	.898	23	.023
Creative Thinking Skills	Control Group	.273	23	.000	.860	23	.024
	Experimental Group	.264	23	.000	.861	23	.039

a. Lilliefors Significance Correction

Based on table 1, the consideration was taken by comparing the Sig. value presented in Shapiro-Wilk since the sample of this study was less than 100. It showed that the Sig. values shown by the control and experimental group in critical thinking skills scores were .060 and 0.23. It meant that the Sig. values of both groups were higher than the standard value 0.05. It indicated that the critical thinking skills data were normal. In addition, the normal distribution was also found in the data of students' creative thinking skills shown by Sig 0.24 and 0.39 which were higher than 0.05. The data were continued to be analysed through homogeneity testing to find out whether the data were homogeneous or not. The result was presented in table 2.

Table 2. The Homogeneity Test Result of The Obtained Data

Levene's Test of Equality of Error Variances[a]

		Levene Statistic	df1	df2	Sig.
Critical Thinking Skills	Based on Mean	.037	1	44	.848
	Based on Median	.067	1	44	.796
	Based on Median and with adjusted df	.067	1	43.866	.796
	Based on trimmed mean	.029	1	44	.867
Creative Thinking Skills	Based on Mean	.073	1	44	.788
	Based on Median	.025	1	44	.875
	Based on Median and with adjusted df	.025	1	43.956	.875
	Based on trimmed mean	.070	1	44	.793

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.
a. Design: Intercept + Group

Table 2 showed that both of the data had a significance (Sig.) lower than 0.05 viewed from the Sig on *Based on Mean*. The significance value of students' critical thinking was 0.848 > 0.05 and the significance value of 0.788 > 0.05. It revealed that the data were homogenous. Since the data were normal and homogeneous, then inferential statistical analysis was conducted.

The Effect of Problem-Based Blended Learning on Students' Critical Thinking Skills

The descriptive statistical analysis was also conducted to compare the mean of post-test gained by control and experimental group. The result was presented in table 3, as follow.

Table 3. The Descriptive Analysis Result of Students' Critical Thinking Skills

Critical Thinking Score	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	Upper Bound	Minimum	Maximum
Control Group	23	81.22	2.66	.111	70.41	71.34	75	86
Experimental Group	23	84.91	3.78	.137	70.97	71.81	77	92
Total	46	82.37	3.21	.178	71.00	74.74	70	84

The descriptive analysis presented in table 3 showed that there was a difference on between the mean score gained by the students who were taught by conventional

learning (control group) and the students who were taught by problem-based blended learning (experimental group). It was found out that the mean score gained by control group was 81.22 lower than the experimental group which reached the mean score 84.91. It indicated that there was an effect given by problem-based blended learning towards students' critical thinking skills. It was supported by the result of One-Way ANOVA analysis as presented in table 4.

Table 4. The result of One-Way ANOVA Analysis of Students' Critical Thinking Skills

ANOVA
Critical Thinking Scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	46.000	1	46.000	11.316	.002
Within Groups	178.870	44	4.065		
Total	224.870	45			

The result presented in table 4 showed that there was a significant effect of problem-based blended learning towards students' critical thinking skills considering that the Sig. value between group was .002 which was lower than the standard value 0.05.

The Effect of Problem-Based Learning Towards Students' Creative Thinking Skills

The obtained data related to students' creative thinking skills were firstly analysed descriptively in which the result was presented in table 5, as follow.

Table 5. The Descriptive Analysis Result of Students' Creative Thinking Skills

Creative Thinking Score	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	Upper Bound	Minimum	Maximum
Control Group	23	77.48	4.64	.256	80.82	81.94	70	84
Experimental Group	23	80.00	3.95	.265	80.84	81.88	70	84
Total	46	78.74	4.30	.182	81.00	81.74	70	84

Table 5 showed that the mean of control group was lower than the mean of experimental group indicated by 77.48 < 80.00. It meant that there was an effect of problem-based learning towards students' creative thinking skills. It was strengthened by the result of One-Way ANOVA analysis as presented in table 6.

Table 6. The Analysis Result of One-Way ANOVA of Students' Creative Thinking Skills

ANOVA
Creative Thinking Score

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	128.891	1	128.891	7.598	.000
Within Groups	746.435	44	16.964		
Total	875.326	45			

The table 6 showed that there was a significant effect contributed by problem-based blended learning shown by Sig.000 which was lower than the standard value .005.

The Simultaneous Effect of Problem-Based Blended Learning towards Students' Critical and Creative Thinking Skills

The data related to students' critical and creative thinking skills obtained from the post-test was analysed through One-Way MANOVA test. The multivariate test result was presented in table 7, as follow.

Table 7. The Multivariate Test Result

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	1.000	109717.912b	2.000	43.000	.000
	Wilks' Lambda	.000	109717.912b	2.000	43.000	.000
	Hotelling's Trace	5103.159	109717.912b	2.000	43.000	.000
	Roy's Largest Root	5103.159	109717.912b	2.000	43.000	.000
Learning Models	Pillai's Trace	.001	.020b	2.000	43.000	.006
	Wilks' Lambda	.999	.020b	2.000	43.000	.006
	Hotelling's Trace	.001	.020b	2.000	43.000	.006
	Roy's Largest Root	.001	.020b	2.000	43.000	.006

a. Design: Intercept + Group
b. Exact statistic

Based on table 7, it was interpreted that problem-based blended learning has a simultaneous effect towards students' critical and creative thinking skills. It was shown by the Sig. 0.006 which was lower than the standard value 0.05. Then, a detail interpretation was also viewed from the result of *test between subject effect* as presented in table 8.

Table 8. The Result of Test Between Subject Effect

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Critical Thinking Score	.348[a]	1	.348	.029	.865
	Creative Thinking Score	.022[b]	1	.022	.014	.907
Intercept	Critical Thinking Score	289937.043	1	289937.043	24410.673	.000
	Creative Thinking Score	304566.283	1	304566.283	195076.632	.000
Learning Model	Critical Thinking Score	.348	1	.348	.029	.000
	Creative Thinking Score	.022	1	.022	.014	.000
Error	Critical Thinking Score	522.609	44	11.877		
	Creative Thinking Score	68.696	44	1.561		
Total	Critical Thinking Score	290460.000	46			
	Creative Thinking Score	304635.000	46			
Corrected Total	Critical Thinking Score	522.957	45			
	Creative Thinking Score	68.717	45			

a. R Squared = .001 (Adjusted R Squared = -.022)
b. R Squared = .000 (Adjusted R Squared = -.022)

The result in table 8 showed that; 1) there was a significant effect of problem-based blended learning on students' critical thinking skills shown by Sig. 0.00 < 0.05, 2) there was a significant effect of problem-based blended learning on students' creative thinking skills shown by Sig. 0.00 < 0.05. Based on the results of MANOVA test that had been described, the third hypothesis in this study is accepted, namely that there is a simultaneous influence of the problem-based blended learning model on students' critical thinking skills and creative thinking skills.

Discussion

The result showed that there was an effect of problem-based blended learning towards students' critical thinking skills. It supported the statement argued by Ariyana (2019) which showed that one of the economic learning objectives was building students as an individual with a logic and critical thinking to solve the problem found in their social lives. Indirectly, the results of the study showed that the students' mean score in the experimental group was 81.22 which was greater than the

control group's 84.91 indicating that students who were taught using the problem-based blended learning model had higher critical thinking skills and were able to achieve learning objectives. economy. The results of the current study also supported the previous study conducted by Zamroni et al., (2020) which found that students who were taught using problem-based learning methods through blended learning had higher critical thinking skills than students who were taught problem-based learning through offline learning. It was relevant to the current study considering that the control group was taught using problem-based blended learning model in an offline learning process where the mean score obtained by the control group was lower than the experimental group which was taught using problem-based learning through blended learning.

The previous studies conducted by Marnita et al., (2020) and Yennita and Zukmadini (2021) which also found a relevant finding with this current study. The studies found that problem-based blended learning improved students' critical thinking skills indicated by the different responses given by students in the learning process. The results of the current research were a continuation of those studies considering that the research samples were junior high school students, while the current research selected high school students as the research samples. These findings indirectly strengthen the existence of critical thinking skills in the economics learning process as evidenced by the use of HOTS-based critical thinking questions when collecting the data. The differences in critical thinking skills found in this study indicated that critical thinking was a competency that must be trained routinely for students through the provision of problems and questions arranged based on the level of cognitive dimensions (Srikan et al., 2021; Retnawati et al., 2018). This finding also reinforced the results of the pre-experimental research conducted by Lukitasari et al., (2019) which found that problem-based blended learning improved students' critical thinking skills in biology learning. The current research findings which was quasi-experimental studies strengthened the results of these studies regarding the use of problem-based blended learning in the learning process.

The current study showed that there was an effect of problem-based blended learning towards students' creative thinking skills shown by the difference of post-test score gained by students taught by conventional learning and students taught by problem-based blended learning. The result reinforced the findings of previous research related to the application of problem-based blended learning to improve 20th century skills. Suharyat et al., (2022) conducted research which revealed that problem-based blended learning improved students' 21st century skills including creative thinking skills reflected problem solving ability test. The students who are taught using problem-based blended learning achieved a higher mean score when given a case-based test than students who used conventional models. The results of One-Way ANOVA test which showed that there was a significant difference between students' creative thinking skills who were taught by using problem-based blended learning and students who were taught by conventional learning model indicating that problem-based blended learning improved students' creative thinking skills in economics learning particularly in taxation material. The result supported the

previous research conducted by Supiandi and Julung (2016) pointed out that problem-based blended learning increased students' ability to analyse the data and responded to the problems. It was relevant to the definition of creative thinking skills stated by Qomariyah and Subekti (2021) in which creative thinking skills were skills in analysing data, and providing various problem solving responses.

The current study proved that the application of problem-based blended learning increased students' creative thinking skills which strengthened the previous study found that problem-based blended learning could be applied to increase students' creativity as a manifestation of students' creative thinking skills (Wahyuni et al., 2022). The results of the current research also supported the research conducted by Koyimah et al., (2021) revealing that problem-based blended learning was more effective than conventional learning. The results of the current research showed that there was a simultaneous effect of problem-based blended learning on students' critical thinking skills and creative thinking skills supported statements related to the application of problem-based blended learning. It was stated that problem-based blended learning was an innovative learning model that not only increased students' learning independence but also improved their critical and creative thinking skills as a significant contribution in the long-term learning process (Tsai & Tang, 2017; Saptenno et al., 2019). The existence of a significant simultaneous effect of problem-based blended learning on students' critical thinking skills and creative thinking found in this study supported the findings of previous study related to a significant correlation between students' creative thinking skills and critical thinking through learning blended learning implemented using problem-based learning methods.

The similar finding was shown by the previous studies in which problem-based blended learning becoming an effective open-ended learning model increasing students' cognitive development (Dawilai et al., 2018; Yulianawati et al., 2022). It was relevant to the results of current research where there was a significant effect of problem-based blended learning on students' creative thinking skills. In addition, the results of the current research also increased the existence of problem-based blended learning as a learning model to improve students' ability to solve problems where this ability was inseparable from students' critical and creative thinking skills (Ati & Setiawan, 2020; Ismail & Edi, 2022). The simultaneous effect of problem-based blended learning on students' critical and creative thinking skills found in this study also strengthened the hypothesis proved by relevant research where the implementation of problem-based blended learning was effective for increasing participants' thinking skills students (Alfi et al., 2016).

D. Conclusion

Based on findings discussed in the previous section, the conclusion was taken in which there were three main important things concluded in this study; 1) there was an effect of problem based-blended learning towards students' critical thinking skills, 2) there was an effect of problem based-blended learning towards students' creative thinking skills, 3) there was a simultaneous effect of problem-based blended learning towards students' critical and creative thinking skills. Those findings strengthened the

existence of problem-based blended learning as a learning model in economic learning process in which it was practically implemented in the learning process. Further research needed to be conducted to gain a deeper investigation in a broader scope related to problem-based blended learning implementation.

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