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Impacts of Online Problem-Based Learning and Online Self-Efficacy on Students'Ability in Writing Problem Solution Essays

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Abstract
This research aims to determine the impact of applying problem-based online learning strategy and online self-efficacy on the EFL students' ability in writing a problem-solution essay. This research used quasi-experimental design. It was conducted at a reputable university in Kediri City of East Java, Indonesia, involving 81 first semester students of Pharmacy study program of Health Sciences Faculty. The students were divided into 2 groups: experimental group consisting of 41 students and control group consisting of 40 students. This research showed that the experimental group can improve their ability in writing a problem-solution essay better than the control group who did not gain online self-efficacy. Thus, having been taught how to apply a problem-based online strategy and applied online self-efficacy, students can improve their ability in writing a problem-solution essay.

Keywords: Problem-based online learning (PBOL), Online self-efficacy (OSE) English Writing Ability

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INTRODUCTION

One of the strategies that can be used to solve problem in the teaching of English writing is the Problem-Based learning (PBL) strategy. This strategy is appropriate because it is student-centered or student-centred learning (Herianto et al., n.d.). In addition, it can run optimally as expected when the learning process is in progress and it can be conditioned properly according to the lesson plan that the teacher has made. PBL is the first approach to acquiring problem-solution skills or problem-solution skills (Maulida, 2023). According to Ward (2002) and Stepien et al. (1993), PBL is a learning model that involves students to solve a problem through the stages of the scientific method so that students can learn related knowledge with the problem as well as have the skills to solve the problem. These skills include making hypotheses, designing experiments, conducting investigations, collecting data, interpreting data, making conclusions, presenting, discussing, and making reports. This situation shows that the PBL model is expected to increase students' understanding of what is learned so that students can apply it daily. Problem-based Learning, according to is set for problem-solution and reasoning (Maulida, 2023); PBL is also based on progressive understanding where students are allowed to solve problems by involving them in the real world

(Almulla, 2020; Matlala, n.d.; Rohm et al., 2021). Moreover, in terms of learning, special treatment is given so that students can expand their knowledge of a learning topic. Online project-based collaborative learning is expected to improve student performance, learning experience, and problem-solution (Maulida, 2023; Sakamaki et al., 2022).

PBL is a learning-oriented constructivism theoretical framework (Dasna & Sutrisno, 2007). The focus of PBL learning lies on the chosen problem so that students learn concepts related to problems and scientific methods for solution these problems (Bate et al., 2014, 2014; Kelson & Distlehorst, 2000). Problems that are used as the focus of learning can be solved by students through group work so that they can provide various learning experiences such as cooperation and interaction in groups (Foo et al., 2021; Lu & Xie, 2024; Yew & Schmidt, 2012). Therefore, students must not only understand concepts relevant to the problem that is the centre of attention but also gain learning experiences related to skills in applying the scientific method in problem-solution and cultivating critical thinking patterns.

The Problem-Based Online Learning (PBOL) Model can be the right learning model chosen to encourage students to be active in learning and train students to think critically in solution problems, where critical and creative thinking skills are one of the skills needed by graduates in the 21st century (Asonitau, 2015; Scott, 2015; Wagner, 2015, Liza et al., 2011: Trilling and Fadel, 2009). Some experts say that university graduates need critical thinking skills to be able to survive the challenges of the 21st century; able to meet the demands of globalization; able to face and solve social, scientific and practical problems effectively, and able to contribute as citizens (Wagner et al., 2015).

Based on the work of Ding and Zhang (2018), students who are involved in online PBL also result in them being disoriented without help or guidance when using information online, so effective tools must be available to support PBL activities. Besides that, other variables that affect PBOL, such as learning success, communication skills, etc., affect PBOL success (Aslan, 2013), one of which is self-efficacy.

According to (Zimmerman, 2000) student self-efficacy is necessary for Learning and student performance for learning success (Komarraju, 2013). Although researchers consider self-efficacy as a significant predictor of academic performance in the context of cognitive abilities, self-efficacy is more known as a strategy of self-regulation in a relationship (Komarraju, 2013). This research is supported by previous research, including that conducted by Rorimpandey, 2019, which examined the Effect of Hybrid Learning strategies and Self-Efficacy of PGSD Students on Understanding and Application of Science Learning Concepts. The characteristics of the problem-based learning model include:

1. problems are the starting point in learning
2. problems raised are problems that exist in the real world that are unstructured
3. problems that require multiple perspectives, and
4. problems that challenge limited knowledge.

Owned by students, attitudes, and competencies which then require identification of learning needs and new areas of learning; 5) Learning self-direction becomes the main thing; 6) Utilization of various sources of knowledge, their use, and evaluation of information sources is an essential process in Problem-

Based Learning, 7) Learning is collaborative, communication, and cooperative, 8) Development of inquiry and problem-solution skills is as important as mastery of content knowledge to find solutions to a problem, 9) synthesis and integration of a learning process, 10) Problem-Based learning, involve evaluating and reviewing student experiences and learning processes (Rusman, 2010, p. 232). In implementing the Problem-Based Learning learning model, there are steps in its implementation.

Bandura (2012) defines self-efficacy as an individual's belief (self-confidence) in achieving the desired results. Self-efficacy can also be defined as a person's belief about his ability to organize, determine, and carry out the actions that need to be taken to achieve the expected results (Shehadeh et al., 2020). The higher a person's belief in the chosen action, the higher they will survive the obstacles or conditions they experience. In line with that Ryan et.al (2020) stated that self-efficacy is one aspect of self-knowledge which is the most influential in everyday human life because self-efficacy possesses influence the individual in determining the actions to be taken to achieve a goal, including estimates of the challenges.

Self-efficacy is closely related to individual beliefs about their capacity to do something, so online self-efficacy is an individual's belief about his capacity to carry out activities online (Abelsson et al., 2020a, 2020a; Bandura, 2023; Tetri & and Juujärvi, 2022). Self-efficacy is a multidimensional construction that forms the basis of the concept of the individual as an agent, purposeful, pro-active, self-evaluation, and self-regulation (Bandura, 1989) (Komarraju, 2013). More specifically, the aspect of self-efficacy is academic self-efficacy which reflects the competence of students who care about their assignments and other academic matters (Schunk & Pajares, 2002).

Based on the data above, the problem formulation as follows: (1) Is there any impact of Online Problem Based Learning on the students' ability of writing problem solution essays?; (2) Is there any impact of Online Self Efficacy on the students' ability of writing problem solution essays?; (3)Is there any interaction between the Online Problem Based Learning and Online Self Efficacy on the students' ability of writing problem solution essays?

METHODS

This research was designed as a quantitative study. The quasi-experimental design was used in this study. The participants of this study were 81 students at the 1st-semester of Pharmacy study program. Participants were grouped into one experimental group of 41 students and one control group of 40 students. The experimental group was given treatment through Problem Based Online Learning strategy, and the control group was assigned conventional strategy. The two groups were also distinguished based on high and low online self-efficacy. The initial ability equivalence test of the experimental and control groups using the independent sample t-test showed that the initial abilities of the two groups were equivalent.

In this research study, two groups were involved, namely the control class

and the experimental class. These two groups have different roles in research. The control class is a group that does not receive treatment or intervention from researchers. This group was used as a comparison to determine the effect of treatment on the experimental group. The experimental class is a group that receives treatment or intervention from researchers. This group was used to see the effect of treatment on research results. The difference between the control and experimental classes can be seen in the treatment. The main difference between the control and experimental classes is the treatment given. The control class did not receive treatment, while the experimental class received treatment. The treatment given to experimental classes can be through learning methods, learning media, curriculum, or other interventions. In this research, the experimental class was given the Online Self-Efficacy strategy.

The Procedure and Data Analysis

The data collection of this study was tested by validity control, reliability control, validity of the experiment and experimental reliability test which showed in the table below:

a. Test the validity of the control

Table 1. Validity control

Experiment Question Code	Pearson Correlation	Sig. (2-tailed)	Information
CC1	0.698	0.000	Valid
CC2	0.567	0.000	Valid
CC3	0.640	0.000	Valid
CC4	0.373	0.018	Valid
CC5	0.664	0.000	Valid
CC6	0.751	0.000	Valid
CC7	0.582	0.000	Valid
CC8	0.767	0.000	Valid
CC9	0.428	0.006	Valid
CC10	0.723	0.000	Valid
CC11	0.611	0.000	Valid
CC12	0.764	0.000	Valid
CC13	0.704	0.000	Valid
CC14	0.350	0.027	Valid
CC15	0.676	0.000	Valid
CC16	0.566	0.000	Valid
CC17	0.687	0.000	Valid
CC18	0.512	0.001	Valid
CC19	0.664	0.000	Valid
CC20	0.722	0.000	Valid

Table 1 shows the results of the validity test on 20 question items (codes CC1 to CC20) in the research instrument. The “Pearson Correlation” column displays the correlation value between each item and the total score, while the “Sig. (2-tailed)” column shows the statistical significance of the correlation. All items have a significance value below 0.05, which indicates that all items in the instrument are valid and suitable for use in measuring research variables.

b. Control reliability test

Table 2. Reliability test

Cronbach's Alpha	N of Items	Information (>0.400)
0.910	20	High Reliability

Table 2 presents the results of the reliability test on the research instruments used in the control class. The Cronbach's Alpha value obtained is 0.910, which far exceeds the minimum limit of 0.400. This value indicates that the instrument has a very high level of internal consistency. Thus, it can be concluded that the research instrument is reliable and can be trusted to be used in measurement. From the tables above it can be stated that the test of reliability of control class is in high reliability.

c. Validity of the experiment test

Table 3. Experiment test

Experiment Question Code	Pearson Correlation	Sig. (2-tailed)	Information
ES1	0.862	0.000	Valid
ES2	0.785	0.000	Valid
ES3	0.826	0.000	Valid
ES4	0.537	0.000	Valid
ES5	0.881	0.000	Valid
ES6	0.835	0.000	Valid
ES7	0.863	0.000	Valid
ES8	0.918	0.000	Valid
ES9	0.830	0.000	Valid
ES10	0.603	0.000	Valid
ES11	0.863	0.000	Valid
ES12	0.887	0.000	Valid
ES13	0.839	0.000	Valid
ES14	0.759	0.000	Valid
ES15	0.872	0.000	Valid
ES16	0.797	0.000	Valid
ES17	0.822	0.000	Valid
ES18	0.886	0.000	Valid
ES19	0.778	0.000	Valid
ES20	0.849	0.000	Valid

Table 3 shows the results of the validity test of the 20 question items (coded ES1 to ES20) used in the experimental group. The Pearson Correlation values for all items show high numbers, ranging from 0.537 to 0.918, with a significance value (Sig. 2-tailed) of 0.000 for all items. This shows that each item has a significant correlation with the total score, and all items are declared valid. Thus, the instrument used in the experimental group can be concluded to have good validity. From the tables above it can be stated that the test of validity of experimental class is in valid.

d. Experimental reliability test

Table 4. Reliabilty tes experimental class

Cronbach's Alpha	Number of Question Items	Information (>0.400)
0.972	20	High Reliability

Table 4 shows the results of the reliability test on the instruments used in the experimental class. The Cronbach's Alpha value obtained is 0.972, which is a very high number and far exceeds the minimum reliability limit of 0.400. Thus, the instrument has a very good level of internal consistency, so it can be concluded that the measuring instrument in this experimental class is very reliable and can be used for research purposes with a high level of confidence. From the tables above it can be stated that the test of reliability of experimental class is in high reliability

RESULTS & DISCUSSION

This section describes successively: (1) description of research results; (2) pretest and posttest data analysis; (3) summary of research results. In the general description section, the study's results describe an overview of self-efficacy and the extent to which the concept of learning to speak English is explained. The grouping of students in this study is based on the learning strategies used and each learner's self-efficacy.

Description of Research Results

This research was conducted in two groups of students. The number of students involved in this study was 81, consisting of 41 students in the first group using the PBOL learning strategy and 40 students in the second group using the face-to-face learning strategy.

A learner's success in learning is seen from more than one aspect because several factors may make a learner experience failure in learning. Learning using PBOL and Face To face strategies has different results. Students' self-efficacy with the PBOL method has a high value in learning. Because Self Efficacy emphasizes the level of strength or individual stability of their beliefs, self-efficacy shows that the actions taken by individuals will produce results that are what the individual expects. The research also examines the student's creativity in writing problem solution essay using English language. According to Suryanto (2020) Creative problem solution is a problem-based learning strategy created for creative problem solutions. Creativity reveals problems that are given, discussed, and ideas discovered. Creativity in problem-solution can be interpreted as a skill to achieve the required goals through a creative process to find new solutions. Therefore, self-efficacy is expected to be able to foster creative thinking in students in this research. The diagram and table below show the respondent control categorization level.

Table 5. control categorization level

	Frequency	Percentage (%)
High	21	52,5%

Low	19	47,5%
Total	40	100%

Table 5 presents the level of category of results in the control class which is divided into two groups, namely the high category and the low category. Out of a total of 40 respondents, 21 respondents (52.5%) fell into the high category, while 19 respondents (47.5%) fell into the low category. This data shows that the majority of participants in the control class were at a high level of achievement.

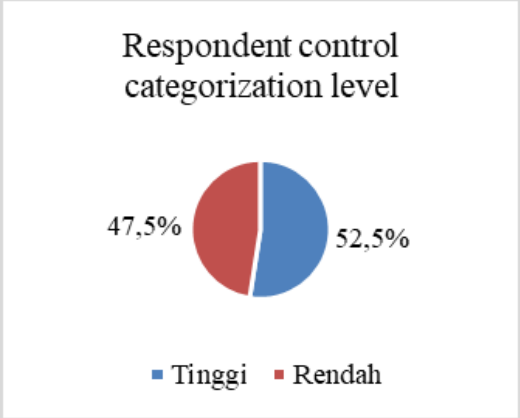

Figure 1. responden control categorization

Figure 1 shows a pie chart illustrating the level of categorization of respondents in the control class. This diagram divides respondents into two categories, namely High and Low. A total of 52.5% of respondents were in the high category, while 47.5% of respondents were in the low category. This visualization clarifies the distribution of the proportion of respondents' achievement results in the control class, where the majority have a high level of achievement. The diagram and table below show the respondent experimental categorization level.

Table 6. Respondent experimental categorization level

	Frequency	**Percentage (%)**
High	21	51,2%
Low	20	48,8%
Total	41	100%

Table 6 presents the distribution of respondents' achievement levels in the experimental class. Of the total 41 respondents, 21 respondents (51.2%) were in the high category, while 20 respondents (48.8%) were in the low category. This comparison shows that most respondents in the experimental class have a high level of achievement, although the difference is not very significant compared to the low category.

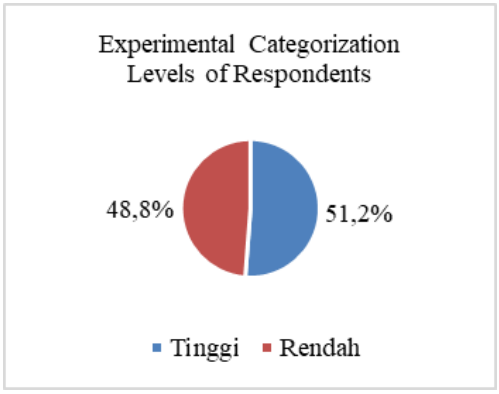

Figure 2. Responden experimental categorization

Figure 2 displays a pie chart illustrating the level of categorization of respondents' learning outcomes in the experimental class. Of the total respondents, 51.2% were in the high category, while 48.8% were in the low category. This visualization shows that most participants in the experimental class had high achievement, although the difference was relatively small compared to the low category. This graph reinforces the data in the previous table and facilitates visual interpretation of the distribution of respondents' outcome categories. The diagram and table below show the level of pretest and posttest scores from each group.

Table 7. Results of High and Low Categorization on Pretest and Posttest

	C2 Pretest	C2 Posttest	C3 Pretest	C3 Posttest
High	17	20	20	21
Low	23	20	20	19

Table 7 presents data on the number of respondents in two classes (C2 and C3) based on high and low categories for pretest and posttest scores. In class C2, there was an increase in the number of students in the high category from 17 people in the pretest to 20 people in the posttest, and a decrease in the low category from 23 to 20. Meanwhile, in class C3, the number of students in the high category increased from 20 to 21, while the low category decreased from 20 to 19. This data indicates a positive shift in the achievement of student learning outcomes after treatment, both in class C2 and C3.

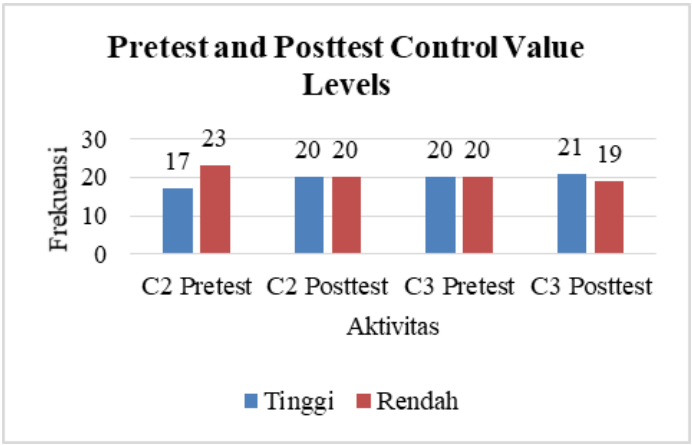

Figure 3. Responden experimental categorization

This figure shows a comparison of respondents' level of grade control between pretest and posttest on two activities, namely C2 and C3. The frequency of respondents is categorized into two levels: High (marked in blue) and Low (marked in red). In activity C2, there was an increase in the number of respondents in the High category from 17 in the pretest to 20 in the posttest, while the Low category increased more significantly from 23 to 20. In activity C3, the number of respondents in the High category remained stable at 20 for both the pretest and posttest, while the Low category decreased slightly from 20 to 19. This data indicates a small shift towards increased grade control in the High category post-intervention.

Experimental Class/Group

Tabel 8. Distribution of Respondents Categories in the Pretest and Posttest

	C2 Pretest	C2 Posttest	C3 Pretest	C3 Posttest
High	21	22	23	22
Low	20	19	18	19

Table 8. presents data on the number of respondents categorized in the High and Low levels in C2 and C3 activities, both before (pretest) and after (posttest) the implementation of the intervention. In activity C2, the number of respondents in the High category increased slightly from 21 in the pretest to 22 in the posttest, while the Low category decreased from 20 to 19. In activity C3, there was a slight decrease in the High category from 23 to 22, and a slight increase in the Low category from 18 to 19. Overall, these distribution changes reflect a stable trend with a slight shift between the High and Low categories in both activities.

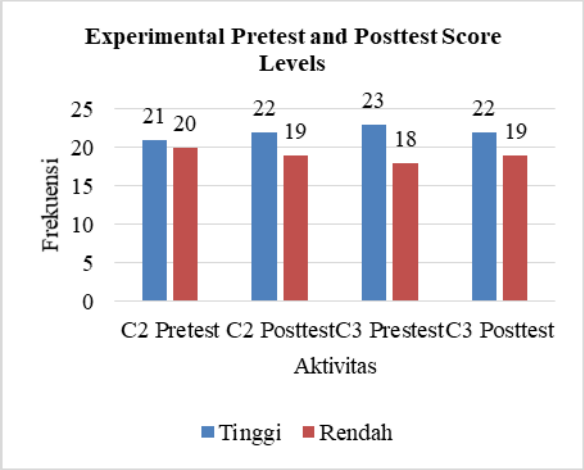

Figure 4. Experimental Pretest and Posttest Score Levels

This figure illustrates the frequency distribution of respondents in the High (blue color) and Low (red color) categories based on the pretest and posttest scores on activities C2 and C3. In activity C2, respondents with High scores slightly decreased from 21 in the pretest to 20 in the posttest, while the Low category actually increased from 20 to 22. In contrast, in activity C3, there was a slight decrease in the High category from 23 to 22, while the Low category increased from 18 to 19. This graph shows a shift in respondents' scores, with a slight decrease in

the High category and an increase in the Low category after the implementation of the intervention.

Table 9. Value based on online self-efficacy

SE		N	Mean	Std. Deviation
C2_Pretest	High	42	45,6190	8,78733
	Low	39	44,1282	7,69203
C3_Pretest	High	42	36,4286	11,17301
	Low	39	37,7436	12,73767

Table 9 presents the mean and standard deviation of the C2 and C3 activities at the pretest stage, categorized by the Online Self-Efficacy (SE) levels of High and Low. In the pretest C2 activity, the group with high self-efficacy (N=42) had an average score of 45.62 with a standard deviation of 8.79, while the group with low self-efficacy (N=39) had a slightly lower average score of 44.13 with a standard deviation of 7.69. Meanwhile, in the pretest C3 activity, the group with high self-efficacy showed an average score of 36.43 with a standard deviation of 11.17, while the low self-efficacy group had a slightly higher average score of 37.74 with a standard deviation of 12.74. This data shows that in C2 activities, the level of self-efficacy is directly proportional to the score, but in C3 activities there appears to be the opposite trend.

Table 10. Lavene's test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
C2_Pretest	Equal variances assumed	0,238	0,627	0,810	79	0,420
	Equal variances not assumed			0,814	78,737	0,418
C3_Pretest	Equal variances assumed	0,581	0,448	-0,495	79	0,622
	Equal variances not assumed			-0,492	75,824	0,624

Table 10 show that Levene's Test for Equality of Variances shows a p-value = 0.627 > 0.05, which means there is no significant difference in variance between the high SE and low SE groups.

The T-test assuming equal variances produces a value of t = 0.810 and p = 0.420 > 0.05.

The T-test assuming unequal variances produces a value of t = 0.814 and p = 0.418 > 0.05.

It can be concluded that there is no significant difference in C2_Pretest scores between groups with high SE and low SE.

Levene's Test for Equality of Variances shows a p-value = 0.448 > 0.05, which means there is no significant difference in variance between the high SE and low SE groups.

The T-test assuming equal variances produces a value of t = -0.495 and p = 0.622 > 0.05.
The T-test assuming unequal variances produces a value of t = -0.492 and p = 0.624 > 0.05.
It can be said that there is no significant difference in C3_Pretest scores between groups with high SE and low SE.

Table 11. Posttest Value Based on Online Self-Efficacy

SE		N	Mean	Std. Deviation
C2_Posttest	High	42	61,8333	14,09708
	Low	39	60,7692	15,64989
C3_Posttest	High	42	50,7381	15,97263
	Low	39	52,5641	15,97662

Table 11 displays the mean (Mean) and standard deviation (Std. Deviation) scores on the C2 and C3 activities at the posttest stage, classified by the Online Self-Efficacy (SE) levels of High and Low. In the C2 posttest activity, the high self-efficacy group (N=42) recorded an average score of 61.83 with a standard deviation of 14.10, while the low self-efficacy group (N=39) had a slightly lower average score of 60.77 with a standard deviation of 15.65. For the posttest C3 activity, the high self-efficacy group showed an average score of 50.74 with a standard deviation of 15.97, while the low self-efficacy group had a slightly higher average score of 52.56 with a standard deviation of 15.98. These results show that in the C2 activity, the tendency for posttest scores to be higher in the high self-efficacy group, while in the C3 activity there appears to be a reverse trend, similar to the pattern in the pretest.

Table 12. Lavene's test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
C2_Posttest	Equal variances assumed	0,498	0,482	0,322	79	0,748
	Equal variances not assumed			0,321	76,555	0,749
C3_Posttest	Equal variances assumed	0,028	0,867	-0,514	79	0,609
	Equal variances not assumed			-0,514	78,554	0,609

Table 12 show the results of Levene's Test to test the equality of variances and t-test to test the difference in the average posttest scores on activities C2 and C3 based on the level of Online Self-Efficacy. In the C2 posttest activity, the Levene's Test value shows F = 0.498 with a significance (Sig.) of 0.482, which means that the variance of the two groups is considered homogeneous (p > 0.05). The t-test results showed a value of t = 0.322 with a significance of 0.748, which was also not significant (p > 0.05), indicating that there was no significant mean difference between the high and low self-efficacy groups. Similarly, on the posttest

C3 activity, the Levene's Test value was F = 0.028 with Sig. 0.867, which again indicated homogeneity of variance. The t-test results showed t = -0.514 with Sig. 0.609, which is also not significant. Overall, this table confirms that there was no significant difference in posttest scores between the groups based on self-efficacy levels in either the C2 or C3 activities.

Table 13. T Test Post-Test Values C2 and C3 based on STR

STR		N	Mean	Std. Deviation
C2_Posttest	Offline	40	51,2500	11,24722
	Online	41	71,1463	10,64087
C3_Posttest	Offline	40	41,5000	12,43651
	Online	41	61,4878	12,35541

This table presents the mean scores and standard deviations of post-test results for activities C2 and C3, categorized by the learning mode (*STR*: Strategy), namely *Offline* and *Online*. For C2 post-test, participants in the offline group (N = 40) achieved a mean score of 51.25 with a standard deviation of 11.25, whereas the online group (N = 41) recorded a notably higher mean score of 71.15 with a standard deviation of 10.64. Similarly, in the C3 post-test, the offline group obtained a mean score of 41.50 with a standard deviation of 12.44, while the online group again demonstrated higher performance with a mean score of 61.49 and a standard deviation of 12.36. These results indicate that participants engaged in online learning consistently outperformed their offline counterparts in both activities.

Table 14. Lavene's test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
C2_Posttest	Equal variances assumed	0,481	0,490	-8,180	79	0,000
	Equal variances not assumed			-8,174	78,494	0,000
C3_Posttest	Equal variances assumed	0,598	0,442	-7,256	79	0,000
	Equal variances not assumed			-7,255	78,921	0,000

Table 14 show that Levene's Test for Equality of Variances shows a p-value = 0.482 > 0.05, which means there is no significant difference in variance between the high SE and low SE groups.

The T-test assuming equal variances produces a value of t = 0.322 and p = 0.748 > 0.05.

The T-test assuming unequal variances produces a value of t = 0.321 and p = 0.749 > 0.05.

It can be stated that there is no significant difference in C2_Posttest scores between groups with high SE and low SE.

Levene's Test for Equality of Variances shows a p-value = 0.867 > 0.05, which means there is no significant difference in variance between the high SE and low SE groups.

The T-test assuming equal variances produces a value of t = -0.514 and p = 0.609 > 0.05.

The T-test assuming unequal variances produces a value of t = -0.514 and p = 0.609 > 0.05. It can be concluded that there is no significant difference in C3_Posttest scores between groups with high SE and low SE.

Online problem-based learning (PBL) is grounded in constructivist learning theory, which emphasizes active engagement and real-world problem-solving. When applied to writing problem-solution essays, PBL encourages students to explore complex issues, analyze potential solutions, and develop well-reasoned arguments (Seruni et al., 2020; Yew & Schmidt, 2012). Vygotsky's social constructivism highlights the role of collaborative learning, where students engage in discussions, receive feedback, and refine their writing through peer interactions (Rigopouli et al., 2025; Vygotsky & Cole, 1978). Additionally, cognitive load theory suggests that structuring online PBL activities, such as breaking down the essay-writing process into manageable steps can help students focus on critical thinking and argument development without being overwhelmed by information overload

Self-efficacy, as explained by Bandura's social cognitive theory, plays a crucial role in students' ability to write problem-solution essays in an online environment (Abelsson et al., 2020b; Delıta et al., 2022). When students believe in their capacity to research, organize ideas, and articulate solutions effectively, they are more likely to persist in challenging writing tasks. Mastery experiences, such as successfully completing smaller writing assignments, help build confidence. Vicarious experiences, where students observe peers' successful writing strategies, and social persuasion, through instructor feedback, further enhance self-efficacy. Moreover, self-determination theory suggests that when students experience autonomy in choosing topics, competence through skill-building exercises, and relatedness via online discussions, they become more motivated and engaged in the writing process.

Integrating learning theories into online PBL fosters stronger problem-solution essay writing skills (Chang et al., 2022; Friedman & Deek, 2002; *The Integration of Problem-Based Learning and Problem-Solving Tools to Support Distributed Education Environments | IEEE Conference Publication | IEEE Xplore*, n.d.). By providing structured PBL activities, opportunities for peer collaboration, and continuous feedback, educators can create an environment where students develop both their analytical and writing abilities {Citation}. Strategies such as scaffolding essay-writing stages, modeling strong argumentation techniques, and promoting self-reflection can further enhance students' confidence and performance. When students feel capable of tackling complex problems and articulating their solutions effectively, their writing proficiency improves, leading to more persuasive and well-structured essays.

CONCLUSION

Providing exceptional treatment in the experimental class has a specific effect on this research. The results of writing essays about problem-solution from two classes. The control class has a lower value than the experimental class. This is proven by the results of the post-test that was carried out. Providing online self-efficacy treatment to students belonging to the experimental class makes them more creative in writing problem-solution essays. Judging from the results of the validity and reliability tests, which show differences in numbers from the control class, it is concluded that this self-efficacy treatment has an influence. This indicates that self-efficacy is important in online learning strategies for students to increase creativity in writing essays using English.

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