Integrating Collaborative Learning into Semantic Mapping Strategy to Boost Vocabulary and Reading Comprehension Achievement

Welly Ardiansyah[1*], Iskandar Rosyidin[2], Nurul Aryanti[3], Ahmad Leo Faragusta[4]

[1-4] State Polytechnic of Sriwijaya, Palembang, Indonesia
ardiansyahwelly@gmail.com

Abstract. The study compared students' reading comprehension and English vocabulary before and after instruction using two different instructional strategies: the original semantic mapping strategy and the semantic mapping strategy in conjunction with collaborative learning. The study involved two groups, one serving as the experimental group and the other as the control group, and employed a quasi-experimental methodology that involved non-equivalent control groups. During the first semester of the 2022 academic year, 50 Bidikmisi students from Sriwijaya's State Polytechnic participated in the study. A non-random process was used to divide them into experimental and control groups. Semantic mapping and group learning were used by the experimental group to examine vocabulary and reading comprehension. The control group was instructed in vocabulary and reading comprehension using the original semantic mapping strategy. Before the study began, both groups took a pre-test in vocabulary and reading comprehension to make sure they were similar in terms of their abilities and that they met the requirements of a normal distribution. The same test was administered to both groups at the end of the experiment to compare the effects of the two strategies on the vocabulary and reading comprehension skills of the Bidikmisi students: the original semantic mapping strategy and the semantic mapping strategy combined with collaborative learning. The findings indicated that the experimental group demonstrated enhancements in both vocabulary acquisition and reading comprehension when compared to the control group. Therefore, cooperative learning and semantic mapping be considered as effective techniques for teaching vocabulary and enhancing reading comprehension among EFL students.

Keywords: Reading Comprehension Strategy, Semantic Mapping Strategy, Social Constructivism Learning Approach, Vocabulary Learning Strategy.

R. Martini et al. (eds.), *Proceedings of the 7th FIRST 2023 International Conference on Global Innovations (FIRST-T3 2023)*, Advances in Social Science, Education and Humanities Research 830,
https://doi.org/10.2991/978-2-38476-220-0_3

1 Introduction

In order to learn a new language, vocabulary is crucial. New vocabulary helps students use a language more effectively, so the more words they learn, the better their language skills will be. Because of the fact that there may not be many opportunities to use English in daily life, reading English texts is one of the primary ways that EFL students learn English vocabulary. Numerous studies have demonstrated that reading helps students learn more words because written texts have a greater linguistic variety than spoken texts [1][2][3]. Successful reading comprehension is positively correlated with vocabulary knowledge [4][5]. The consensus among most education theorists and researchers is that a connection exists between one's vocabulary knowledge and their reading comprehension skills, as evidenced by numerous studies [6][7][8][9]. In addition to providing students with vocabulary and reading comprehension in context, simultaneously learning vocabulary and reading has been proposed as a 'pedagogically efficient' approach [10][11].

The above statements are contrary to the facts. Teaching vocabulary and reading comprehension taking place in English classrooms today are still segregated. This segregated-skill approach failed to create authentic communication skills as the skills stand in parallel threads that do not touch, support, or interact with each other [12]. When the skills are not taught together, the teaching learning process will not be meaningful because it is the language that is the focus, not the communication [12]. Segregated skill teaching is not meaningful [13][14]. It is therefore important to evaluate the separation of vocabulary and reading comprehension instruction.

To improve students' vocabulary abilities and students' reading comprehension skill, many researchers may use semantic mapping strategy to help students learn, remember, and comprehend [15][16][17]. Unfortunately, when researchers conducted research, they believe that English skills should be taught per skill base the idea on focusing the teaching [18][19]. The researchers' reason why teaching language skills in their research has to be segregated is to make their students stay focused and practice the strategies that they have just learned [18][20]. No wonder where one skill is emphasized in the classroom, the teacher will also emphasize that students should use those strategies that can also be used in other areas.

A competent teacher knows the importance of integrating language skills [18]. By integrating reading skill with vocabulary instruction, it becomes more engaging, motivating, and effective for students. There will certainly be no boring, repetitive English classes since each meeting has a different setting [21]. Integrated instructions can make the students reach their learning objective [18]. In short, students can achieve their learning objectives through integrated instruction that fosters meaningful communication.

In integrating learning vocabulary and reading comprehension strategy, heterogeneous grouping in the classroom whereby diverse students are placed in the same classrooms may put the teachers of English in pedagogical difficulties [22][23]. Students tend to split themselves in the groups of the same level of proficiency. The fact shows that slow students tend not only to feel reluctant to express their thoughts and avoid class participation and the proficient students respond negatively to the material as their knowledge have been more advanced than their classroom-mates

[24][25]. The heterogeneity of English classes is a major concern for English teachers. It is difficult to focus on the target student in heterogeneous classes. Putting too much emphasis on slow students may turn their fast counterparts into bored learners. It happens because they can complete tasks earlier, they do not have to wait until the next activity. Conversely, if teachers place more emphasis on the faster students, the slower students will feel demotivated and confused since they cannot keep up with the class materials [23].

As a means of overcoming the above issues, according to the researchers, in order to teach vocabulary and reading comprehension, teachers must use collaborative learning that is integrated into a semantic mapping strategy. which requires students to interact and work together in groups that have a small size, made up to four-members of different level of knowledge [26][27]. Through group collaborative learning integrated with semantic strategy, students can construct a deeper understanding and reach a consensus [28][29]. Research has demonstrated that diversity affects the quality of learning in groups. A heterogeneous group may perform better than a homogeneous one [30][31]. Some research revealed that groups with a variety of students are more creative and innovative than groups with students who are all the same. This may be especially true when it comes to learning[32][33].

In this study, the effectiveness of collaborative learning and a semantic mapping strategy in helping Bidikmisi students increase their vocabulary and reading comprehension is being investigated. The main objective of this study is to evaluate how collaborative learning and semantic mapping impact the experimental group by comparing it to the control group, which will only receive instruction in vocabulary and reading comprehension using the original semantic mapping method.

The aim of this study was to examine the following hypotheses:

Hypotheses: The goal of this study was to determine whether there were any statistically significant differences between second-semester Bidikmisi students who received vocabulary and reading comprehension instruction using the original semantic mapping strategy and those who received that instruction while also utilizing collaborative learning strategies. The following null and alternative hypotheses were as a result put forth.

HO: Results from vocabulary and reading comprehension achievement tests show no significant differences between Bidikmisi students who received semantic mapping instruction coupled with collaborative learning and those who received instruction using the original semantic mapping strategy.

H1: Results from vocabulary and reading comprehension achievement tests show an obvious difference between Bidikmisi students who received semantic mapping instruction coupled with collaborative learning and those who received instruction using the original semantic mapping strategy.

2 METHOD

2.1 Participants

The location of Politeknik Negeri Sriwijaya is at the following address: Jl. Srijaya Negara, Bukit Lama, Kec. Ilir Barat I, Kota Palembang, Sumatera Selatan 30128. This research was conducted from 7th May 2022 to 19th August 2022 in the academic year 2021/2022.

All second semester Bidikmisi students at Politeknik Negeri Sriwijaya in Palembang served as the study's target population. The total population of this research was 50 students. There were 31 females and 19 males.

This study employed Purposive sampling. The classes 2A and 2B were used to select the study's sample. Class 2B was designated as the control group and received instruction using the original semantic mapping strategy. Class 2A served as an experimental class and used a semantic mapping strategy combined with collaborative learning. None of the students had prior knowledge of the semantic mapping strategy.

2.2 Instrumentation

The assessments employed by the researchers before and after the study consisted of reading comprehension and vocabulary tests. By contrasting the value of the r table and the r value from the Pearson Correlation Product-Moment, the test results were used to analyze the validity of the items test. Cronbach's alpha values of 0.822 and 0.699 then showed that they were trustworthy to use. For each test, there were 40 multiple-choice questions.

2.3 Procedure

One experimental group (the semantic mapping integrated with collaborative learning) and one control group (the original semantic mapping strategy) were studied. After that, each participant took a pre-test to gauge their reading comprehension and vocabulary knowledge before the first week of instruction. The purpose of the tests was to assess the reading comprehension and vocabulary of the participants.

The primary research phase began after the pre-test, and one experimental group received instructions utilizing a semantic mapping strategy coupled with collaborative learning. In the control group, students were taught using the original semantic mapping strategy. Both study groups received instruction once a week, totaling 14 weeks of instruction.

At the conclusion of the study, both study groups underwent a post-test to evaluate the effectiveness of the collaborative learning-integrated semantic mapping strategy and to compare it with the original semantic mapping strategy in terms of achieving proficiency in vocabulary and reading comprehension. The post-test for both vocabulary and reading comprehension maintained an identical format to the pre-test, comprising 40 multiple-choice questions for each assessment. The obtained scores were statistically examined after data collection.

The data in this quantitative study was also descriptively analyzed by the researchers. The fundamental characteristics of the data in the study are described using descriptive statistics. The sample must be able to satisfy specific assumptions based on the data analysis techniques used in order to generalize the research findings based on the sample size. The normality and homogeneity tests must be run in order to satisfy specific presumptions in parametric tests. The Shapiro-Wilk test is employed to ascertain if continuous data exhibits a normal distribution. If sample comprises fewer than 50 participants, it is advisable to consider utilizing the Shapiro-Wilk test for this purpose [34]. The null hypothesis is embraced, and it is assumed that the data follows a normal distribution when the p-value is greater than 0.05.

To determine whether the variances in different samples are equal, Levene test is applied. The data from the experimental and control groups are said to be homogeneous

if the significant level (Sig.) based on mean is greater than = 0.05. Even though the data variance is not homogenous, the independent sample t-test can still be applied.

2.4 Design

One group was assigned the role of the experimental group, while the other was designated as the control group. The research employed a quasi-experimental design, with one group serving as the experimental group and the other as the control group, and they differed in their characteristics. Collaborative learning and semantic mapping techniques were employed for instructing vocabulary and reading comprehension to the experimental group, while the control group received instruction using the original semantic mapping method for vocabulary and reading comprehension. The dependent variables in this study were the participants' scores in vocabulary and reading comprehension.

3 Results and Discussion

3.1 Results

This section provides an overview of the primary outcomes derived from the present study in accordance with the research questions. Statistical analyses were conducted to address the research questions posed in the study.

SPSS 25 was employed to analyze the data before the treatment phase, specifically to identify the highest and lowest pre-test scores. The experimental group had a minimum pre-test score of 33.00 and a maximum score of 63.00. 58.00 was the lowest post-test score, and 90.00 was the highest. The pre-test scores ranged from 33.00 to 60.00 for the control group. The lowest and highest scores on the post-test were 50.00 and 78.00, respectively.

This indicates that, on the whole, the post-test scores are greater than the pre-test scores, both at the maximum and minimum levels. It means that combining the semantic mapping strategy with the social constructivism learning theory makes it more effective at raising students' vocabulary levels.

Table 1. Descriptive statistics of students' performance on vocabulary tests

	N	Minimum	Maximum	Mean	Std. Deviation
Pretest of Experiment	24	33	63	49.08	7.083
Posttest of Experiment	24	58	90	76.00	10.061
Pretest of Control	26	33	60	49.19	6.870
Posttest of Control	26	50	78	65.54	8.425

Statistical Program for Social Sciences (SPSS), version 25, is used to first verify the normality of the pre-test data. Table 2 reveals that the p-values obtained from the Shapiro and Kolmogorov tests for both the experimental and control groups are above 0.05, signifying that the data conforms to a normal distribution. For parametric statistical analysis, the two main requirements for research data are that they be normally distributed and homogeneous. The researchers conducted assessments for normal distribution and uniformity to determine whether the data in both the experimental and control groups were evenly distributed and showed homogeneity.

Table 2. Tests of normality

		Shapiro-Wilk		
	Classes	Statistic	df	Sig.
Students 'Vocabulary Scores	Pretest of Experimental Class	.953	24	.312
	Posttest of Experimental Class	.931	24	.100
	Pretest of Control Class	.950	26	.227
	Posttest of Control Class	.943	26	.163

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Pre- and post-tests in the experimental class had sig-values of.312 and.100, respectively, as shown in Table 2. The sig-values for the control group are.227 and .163, respectively. The normality assumptions are met because the significance values exceed 0.05. To ensure a consistent comparison of each student's vocabulary between the experimental and control groups following the normality test, this study employed Levene's test. The results of the homogeneity test for the experimental and control groups are presented in Table 3.

Table 3. Levene's test for homogeneity test

		Levene Statistic	df1	df2	Sig.
Vocabulary Scores	Mean	2.066	1	48	.157
	Median	1.582	1	48	.215
	Median and with adjusted df	1.582	1	47.579	.215
	Trimmed mean	1.991	1	48	.165

As shown by Table 3, the Based on Mean was 2.066. Because sig. was 2.066 ≥ 0.05, the variants in each group are similar or homogeneous. Consequently, students who employed the original semantic mapping strategy (control group) and those who used the semantic mapping strategy along with the social constructivism learning theory (experimental group) exhibited vocabulary scores that were homogenous or comparable.

The statistical data analysis used to compare the effects of the semantic mapping strategy, the social constructivism learning theory, and the original mapping strategy on vocabulary acquisition during both the pre-test and post-test phases is presented in Tables 4 and 5. The statistical data analysis used to compare the effects of the semantic mapping strategy, the social constructivism learning theory, and the original mapping strategy on vocabulary acquisition during both the pre-test and post-test phases is presented in Tables 4 and 5.

The table shows that statistically vocabulary proficiency between the two participant groups had no significant difference (p=0.956). It indicates that significant difference did not take place between the two study groups' vocabulary proficiency levels prior to the intervention. The two study groups were given a posttest to assess how well the participants performed in terms of semantic mapping. In order to fully

compare the two study participant groups, another independent samples t-test was conducted.

Table 4. Independent samples test of pre-test vocabulary

			Scores	
			Equal variances assumed	Equal variances not assumed
Levene's Test for Equality of Variances	F		.032	
	Sig.		.859	
t-test for Equality of Means	t		-.055	-.055
	df		48	47.404
	Sig. (2-tailed)		.956	.956
	Mean Difference		-.109	-.109
	Std. Error Difference		1.974	1.976
	95% Confidence Interval of the Difference	Lower	-4.078	-4.084
		Upper	3.860	3.866

Table 5. Independent samples test of post-test vocabulary

			Scores	
			Equal variances assumed	Equal variances not assumed
Levene's Test for Equality of Variances	F		2.066	
	Sig.		.157	
t-test for Equality of Means	t		3.998	3.969
	df		48	45.048
	Sig. (2-tailed)		.000	.000
	Mean Difference		10.462	10.462
	Std. Error Difference		2.617	2.636
	95% Confidence Interval of the Difference	Lower	5.200	5.153
		Upper	15.723	15.770

The combination of the semantic mapping strategy and cooperative learning yielded better results in vocabulary acquisition compared to the original mapping strategy, as illustrated in Table 5. In other words, students who were taught vocabulary using the semantic mapping strategy in conjunction with group learning did so in a statistically significant way (p=0.000). The study's findings show that, in terms of vocabulary learning, students of the semantic mapping strategy combined with collaborative learning outperformed those who used the original semantic mapping strategy; in fact, the experimental group exhibited enhancement in the posttest when applying the collaborative learning strategy in conjunction with the semantic mapping strategy. The study's research question has been effectively addressed. Based on the descriptive statistics related to the mean scores on the pre-test for both the experimental and control groups, it is evident that the two groups exhibited almost identical performance levels before the intervention sessions. In Table 6, it is evident that the experimental group had an average score of 61.19, with a standard deviation of 4.964, whereas the control group had a mean score of 60.08 and a standard deviation of 5.956. However, when examining the post-test mean scores

presented in Table 6, it's noticeable that the experimental group's mean score significantly increased to 77.04, accompanied by a standard deviation of 6.785. In contrast, the control group's post-test mean score was 68.88, with a standard deviation of 5.551, showing a less substantial improvement.

Table 6. Descriptive statistics of students' performance on reading comprehension tests

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Pretest experiment	26	17	53	70	61.19	4.964
Posttest experiment	26	25	63	88	77.04	6.785
Pretest control	24	20	50	70	60.08	5.956
Posttest control	24	22	58	80	68.88	5.551

Table 7. Tests of normality of reading comprehension

		Shapiro-Wilk		
	Classes	Statistic	df	Sig.
Reading Scores	Pretest of Experiment Class	.948	26	.210
	Posttest of Experiment Class	.943	26	.156
	Pretest of Control Class	.943	24	.192
	Posttest of Control Class	.968	24	.606

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

The assessments were examined to determine if they conformed to a normal distribution through a normality test. Through SPSS 25 for Windows, the Kolmogorov-Smirnov formula was used for the analysis. At 0.05, the significance level was established. When the significance level was higher than 5% or 0.05 (i.e., > 0.05), it indicated that the data was displayed in a normal distribution.

Table 7 shows that the significance level for the pre-test in the experimental group is 0.210, and in the control group, it is 0.192. For the post-test, the experimental group has a significance level of 0.156, while the control group has a significance level of 0.606. The normality assumptions are satisfied since the sig-values are greater than 0.05.

To assess if two populations shared a similar distribution, a homogeneity test was carried out, assuming that the data followed a normal distribution. Upon analyzing the mean values presented in the table below, it was found that the significance level for the post-test in both the experimental and control groups was calculated as 0.412. If the value (p) > significant (=0,05), the sample was homogeneous, and the pre-test result was.412>.05, the data was homogeneous and valid, according to the criteria for accepting or rejecting the homogeneity test. It also suggests that the students' levels of reading comprehension were comparable.

Table 8. Test of homogeneity of variance of reading comprehension

		Levene Statistic	df1	df2	Sig.
Reading Scores	Mean	.683	1	48	.412
	Median	.552	1	48	.461
	Median and with adjusted df	.552	1	45.067	.461
	Trimmed mean	.700	1	48	.407

After confirming that the data exhibited both normal distribution and homogeneity, an independent sample t-test was conducted using the pre-test data. As indicated in Table 9, there was no statistically significant difference in the success rates between the groups ($p > 0.05$). The study was trustworthy because the levels of participants were comparable, making the study reliable.

Table 9. Independent samples test of pre-test reading comprehension

			Pre-test Reading Comprehension	
			Equal variances assumed	Equal variances not assumed
Levene's Test for Equality of Variances	F		.733	
	Sig.		.396	
t-test for Equality of Means	t		.717	.712
	df		48	44.950
	Sig. (2-tailed)		.477	.480
	Mean Difference		1.109	1.109
	Std. Error Difference		1.546	1.557
	95% Confidence Interval of the Difference	Lower	-2.000	-2.028
		Upper	4.218	4.246

Table 10. Independent samples test of post-test reading comprehension

			Post-test Reading Comprehension	
			Equal variances assumed	Equal variances not assumed
Levene's Test for Equality of Variances	F		.683	
	Sig.		.412	
t-test for Equality of Means	t		4.633	4.671
	df		48	47.342
	Sig. (2-tailed)		.000	.000
	Mean Difference		8.163	8.163
	Std. Error Difference		1.762	1.748
	95% Confidence Interval of the Difference	Lower	4.621	4.648
		Upper	11.706	11.679

Looking at the results from the pre-test outcomes of both the experimental and control groups in Table 9, a two-tailed significance (sig) value of 0.477 was computed. This led to the conclusion that both the experimental and control groups possessed similar capabilities since both had significance values greater than 0.05. A post-test measuring reading comprehension using independent sample t-tests is presented in Table 10. The t-test's asymptotic significance (Asymp. Sig) was found to be 0.000, which is smaller than 0.05. This indicates that there was a significant improvement in reading comprehension skills between the pre-test and post-test results. Additionally, the computed t-value (t_{obt}) was 4.633, with 48 degrees of freedom. Comparatively, the critical t-value (t_{crit}) at the 0.05 significance level, with 48 degrees of freedom, was 1.677. Importantly, the calculated t_{obt} value (4.633) was higher than the t_{crit} value (1.677), providing strong evidence that reading comprehension achievement significantly improved between the pre- and post-test results.

3.2 Discussion

Results of analyses indicate that combining the semantic mapping strategy with group learning effectively enhances students' vocabulary and reading comprehension. This conclusion is supported by comparing the scores of the experimental group before and after the intervention. More precisely, students in the experimental group showed significant improvements, with their vocabulary and reading comprehension achievement scores increasing by 26.92 and 15.85 points, respectively. In comparison, the control group's scores increased by 16.35 points in vocabulary and 8.8 points in reading comprehension. Moreover, the results of an independent samples t-test conducted with SPSS 25 suggest that students who are taught using a combination of collaborative learning and semantic mapping exhibit superior performance in vocabulary and reading comprehension compared to students who receive instruction without these elements of social constructivism and semantic mapping. These findings of the study concluded that that collaborative learning used in vocabulary and reading comprehension strategy is able to inculcate the inferential thinking among students, thus heightened their vocabulary and comprehension performance [35][36].

As students actively participate in creating connections with lecturers and classmates through semantic mapping and collaborative learning, their social skills can also be enhanced [37][38]. Therefore, using semantic mapping in conjunction with collaborative learning can be very helpful for improving not only reading comprehension but also other cognitive and social skills as well as learning new words.

4 Conclusion

The use of a semantic mapping strategy in both classes increased students' vocabulary and reading comprehension. Students' pre-test to post-test scores improved whether they used the semantic mapping strategy combined with collaborative learning or the standard semantic mapping strategy. However, students who used semantic mapping integrated with collaborative learning showed better results. Within their group and in collaboration with experts, they engage in discussions, share insights, and collectively respond, contributing to an active learning process. Consequently, this collaborative learning has led to enhancements in the students' understanding of vocabulary and reading. Researchers found some implications in the study for both students and lecturers, especially for those lecturers who still think that language teaching should center on the learner. It would be more interesting and meaningful for students to learn vocabulary and reading comprehension using semantic mapping strategies integrated with collaborative learning. The reason for this is that it eliminates the tedious and boring process. Semantic mapping combined with collaborative learning can be a valuable alternative to learning vocabulary and reading comprehension.

References

1. N. Afzal, “A Study on Vocabulary-Learning Problems Encountered by BA English Majors at the University Level of Education,” *Arab World English J.*, vol. 10, no. 3, pp. 81–98, Sep. 2019, doi: 10.24093/awej/vol10no3.6.
2. T. Chavangklang, P. Chavangklang, S. Thiamhuanok, and P. Sathitdetkunchorn, “Development of EFL University Students’ Vocabulary Size and Reading Comprehension

Using Online Multimedia-based Extensive Reading," *Adv. Lang. Lit. Stud.*, vol. 10, no. 5, p. 146, Oct. 2019, doi: 10.7575/aiac.alls.v.10n.5p.146.
3. A. M. Elleman and E. L. Oslund, "Reading Comprehension Research: Implications for Practice and Policy," *Policy Insights from Behav. Brain Sci.*, vol. 6, no. 1, pp. 3–11, Mar. 2019, doi: 10.1177/2372732218816339.
4. T. Gu, "The Effect of Vocabulary Knowledge on Chinese English Learners' Reading Comprehension," *Int. J. English Linguist.*, vol. 7, no. 4, p. 45, Jul. 2017, doi: 10.5539/ijel.v7n4p45.
5. C. Isabelli-García, "Second Language Acquisition and Study Abroad Learning Environments," *Elia*, vol. 17, no. 17, pp. 273–282, 2017, doi: 10.12795/elia.2017.i17.12.
6. K. Zano and N. C. Phatudi, "Relationship between vocabulary knowledge and reading comprehension of South African EFAL high school learners," *Per Linguam*, vol. 35, no. 3, Dec. 2019, doi: 10.5785/35-3-830.
7. A. Masrai, "Vocabulary and Reading Comprehension Revisited: Evidence for High-, Mid-, and Low-Frequency Vocabulary Knowledge," *SAGE Open*, vol. 9, no. 2, p. 215824401984518, Apr. 2019, doi: 10.1177/2158244019845182.
8. Y. Dong, Y. Tang, B. W.-Y. Chow, W. Wang, and W.-Y. Dong, "Contribution of Vocabulary Knowledge to Reading Comprehension Among Chinese Students: A Meta-Analysis," *Front. Psychol.*, vol. 11, no. October, Oct. 2020, doi: 10.3389/fpsyg.2020.525369.
9. J. M. Schneider, A. D. Abel, and M. J. Maguire, "Vocabulary knowledge and reading comprehension account for SES-differences in how school-aged children infer word meanings from sentences," *Lang. Learn. Dev.*, vol. 00, no. 00, pp. 1–17, Jun. 2022, doi: 10.1080/15475441.2022.2081573.
10. L. M. Pérez and R. Alvira, "The Acquisition of Vocabulary Through Three Memory Strategies," *Colomb. Appl. Linguist. J.*, vol. 19, no. 1, pp. 103–116, 2017, [Online]. Available: http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S0123-46412017000100008&lang=pt%0Ahttp://www.scielo.org.co/pdf/calj/v19n1/v19n1a08.pdf
11. R. Ghalebi, F. Sadighi, and M. S. Bagheri, "Vocabulary learning strategies: A comparative study of EFL learners," *Cogent Psychol.*, vol. 7, no. 1, Dec. 2020, doi: 10.1080/23311908.2020.1824306.
12. I. N. Hidayati and D. Sofyan, "Integration or Segregation? (Teachers' Perception on the Use of Whole Language Method)," *J. English Lang. Stud.*, vol. 3, no. 2, p. 203, 2018, doi: 10.30870/jels.v3i2.3576.
13. P. Gautam, "Integrated and Segregated Teaching of Language Skills: An Exploration," *J. NELTA Gandaki*, vol. 1, pp. 100–107, Jun. 2019, doi: 10.3126/jong.v1i0.24464.
14. E. R. Amalia, "The Influence of Integration of Four Skills to The Performance of Undergraduate Students on TOEFL," *Scholast. J. Pendidik. dan Kebud.*, vol. 3, no. 1, pp. 61–74, 2021.
15. A. Abdelghani and M. Ibrahim, "Impact of utilizing semantic maps strategy on the development of English language vocabulary learning for Saudi secondary schools' students," *Int. J. Humanit. Soc. Sci. Educ.*, vol. 4, no. 11, pp. 183–196, 2017, doi: 10.20431/2349-0381.0411022.
16. E. Saragih, "The effect of semantic mapping technique on technical vocabulary mastery for Midwifery students," *Stud. English Lang. Educ.*, vol. 6, no. 2, pp. 333–342, Oct. 2019, doi: 10.24815/siele.v6i2.14786.
17. S. Thaledon, "The use of semantic mapping to improve vocabulary comprehension," *HRD J.*, vol. 11, no. 1, pp. 8–21, 2020.
18. I. N. Hidayati and D. Sofyan, "Integration or Segregation? (Teachers' Perception on the Use of Whole Language Method)," *J. English Lang. Stud.*, vol. 3, no. 2, p. 203, Sep. 2018, doi: 10.30870/jels.v3i2.3576.
19. D. Karakoç and G. D. Köse, "The impact of vocabulary knowledge on reading, writing and

proficiency scores of EFL learners," *J. Lang. Linguist. Stud.*, vol. 13, no. 1, pp. 352–378, 2017, [Online]. Available: www.jlls.org
20. H. Oosterbeek, S. Sóvágó, and B. van der Klaauw, "Preference heterogeneity and school segregation," *J. Public Econ.*, vol. 197, p. 104400, May 2021, doi: 10.1016/j.jpubeco.2021.104400.
21. E. Wildeman, M. Koopman, and D. Beijaard, "Fostering subject teachers' integrated language teaching in technical vocational education: Results of a professional development program," *Teach. Teach. Educ.*, vol. 112, p. 103626, Apr. 2022, doi: 10.1016/j.tate.2021.103626.
22. W. Ardiansyah and M. Ujihanti, "Social Constructivism-Based Reading Comprehension Teaching Design at Politeknik Negeri Sriwijaya," *Arab World English J.*, vol. 9, no. 1, pp. 447–467, Mar. 2018, doi: 10.24093/awej/vol9no1.31.
23. S. Gustiani, "Challenges and Strategies in Teaching English to Heterogeneous Classes: A Case Study," *Edukasi J. Pendidik. dan Pengajaran*, vol. 6, no. 2, pp. 301–310, Dec. 2019, doi: 10.19109/ejpp.v6i2.3909.
24. K. Sedova *et al.*, "Do those who talk more learn more? The relationship between student classroom talk and student achievement," *Learn. Instr.*, vol. 63, no. May, p. 101217, Oct. 2019, doi: 10.1016/j.learninstruc.2019.101217.
25. C. V. Ahmad, "Causes of Students' Reluctance to Participate in Classroom Discussions," *ASEAN J. Sci. Eng. Educ.*, vol. 1, no. 1, pp. 47–62, Feb. 2021, doi: 10.17509/ajsee.v1i1.32407.
26. H. Le, J. Janssen, and T. Wubbels, "Collaborative learning practices: teacher and student perceived obstacles to effective student collaboration," *Cambridge J. Educ.*, vol. 48, no. 1, pp. 103–122, Jan. 2018, doi: 10.1080/0305764X.2016.1259389.
27. H. S. Lu and R. Smiles, "The Role of Collaborative Learning in the Online Education," *Int. J. Econ. Bus. Manag. Res.*, vol. 06, no. 06, pp. 125–137, 2022, doi: 10.51505/IJEBMR.2022.6608.
28. L. de Jong, J. Meirink, and W. Admiraal, "School-based collaboration as a learning context for teachers: A systematic review," *Int. J. Educ. Res.*, vol. 112, no. February, p. 101927, 2022, doi: 10.1016/j.ijer.2022.101927.
29. X. Hu, Y. Liu, J. Huang, and S. Mu, "The Effects of Different Patterns of Group Collaborative Learning on Fourth-Grade Students' Creative Thinking in a Digital Artificial Intelligence Course," *Sustainability*, vol. 14, no. 19, p. 12674, Oct. 2022, doi: 10.3390/su141912674.
30. F. Fallucchi, E. Fatas, F. Kölle, and O. Weisel, "Not all group members are created equal: heterogeneous abilities in inter-group contests," *Exp. Econ.*, vol. 24, no. 2, pp. 669–697, Jun. 2021, doi: 10.1007/s10683-020-09677-5.
31. P. K. Murphy *et al.*, "Exploring the influence of homogeneous versus heterogeneous grouping on students' text-based discussions and comprehension," *Contemp. Educ. Psychol.*, vol. 51, no. September, pp. 336–355, Oct. 2017, doi: 10.1016/j.cedpsych.2017.09.003.
32. J. Decristan, B. Fauth, M. Kunter, G. Büttner, and E. Klieme, "The interplay between class heterogeneity and teaching quality in primary school," *Int. J. Educ. Res.*, vol. 86, no. January, pp. 109–121, 2017, doi: 10.1016/j.ijer.2017.09.004.
33. Y. Kuzmina and A. Ivanova, "The effects of academic class composition on academic progress in elementary school for students with different levels of initial academic abilities," *Learn. Individ. Differ.*, vol. 64, no. April, pp. 43–53, May 2018, doi: 10.1016/j.lindif.2018.04.004.
34. S. DEMİR, "Comparison of Normality Tests in Terms of Sample Sizes under Different Skewness and Kurtosis Coefficients," *Int. J. Assess. Tools Educ.*, vol. 9, no. 2, pp. 397–409, Jun. 2022, doi: 10.21449/ijate.1101295.
35. M. Rodríguez, I. Díaz, E. J. Gonzalez, and M. González-Miquel, "Motivational active

learning: An integrated approach to teaching and learning process control," *Educ. Chem. Eng.*, vol. 24, pp. 7–12, Jul. 2018, doi: 10.1016/j.ece.2018.06.003.
36. H. Mora, M. T. Signes-Pont, A. Fuster-Guilló, and M. L. Pertegal-Felices, "A collaborative working model for enhancing the learning process of science & engineering students," *Comput. Human Behav.*, vol. 103, no. September 2019, pp. 140–150, Feb. 2020, doi: 10.1016/j.chb.2019.09.008.
37. S. H. Tamimi Sa'd and F. Rajabi, "Teaching and Learning Vocabulary: What English Language Learners Perceive to Be Effective and Ineffective Strategies," *Cent. Educ. Policy Stud. J.*, vol. 8, no. 1, pp. 139–163, Mar. 2018, doi: 10.26529/cepsj.492.
38. A. Vakilifard, K. Bahramlou, and M. Mousavian, "The effect of cooperative learning approach and semantic mapping strategy on the acquisition of L2 Persian vocabulary," *Cogent Educ.*, vol. 7, no. 1, Jan. 2020, doi: 10.1080/2331186X.2020.1762287.