

Research on the Impact of Implementing Multimodal Task-Based Teaching Method on Group Collaborative Learning Skills

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Abstract: Group cooperative learning is an important language learning approach and skill. This study conducted a quasi experimental intervention using multimodal task-based teaching method on 56 students in the experimental group. Before and after intervention, a group cooperation self-perception questionnaire was used to investigate from three dimensions: engagement, accountability and satisfaction. Through a questionnaire, investigate how students' group cooperative learning ability is affected after multimodal task teaching, So as to improve the efficiency of students' group cooperative learning.

Keywords: Multimodal Task-based Teaching; Group Work; Teaching Intervention.

1. Introduction

Although multimodal task-based learning has been widely promoted, research and practice on promoting group collaborative learning skills through it in vocational English teaching are currently limited. This study conducted a quasi experimental research on a vocational college in China. Before and after intervention, a group cooperation self-perception questionnaire was used to investigate from three dimensions: participation, accountability, and satisfaction. Conduct a questionnaire survey on how students' ability to learn collaboratively in groups is affected after intervention in multimodal task teaching.

2. Literature Review

The Task-Based Learning model is a language teaching approach that emerged in the 1980s, emphasizing the Task-Based Learning (TBL) teaching model. In Ellis (2003) and Willis (1996)'s theory, TBL is a teaching method that uses target language to simulate practical tasks, in which learners are encouraged to use communicative language for communication. Meaningful communication around tasks is a characteristic of task-based teaching methods. In the TBL method, the key is to truly use language for communication (Gan, 2022)

Multimodality Theory defines information interaction as a composite dynamic system from the perspective of human cognition and communication studies. This theory suggests that humans simultaneously activate multiple sensory channels such as vision, hearing, touch, and smell in the process of information processing, and organically integrate diverse semantic resources such as language symbols, visual images, sound signals, and body movements to construct a three-dimensional network of meaning. By synergistically complementing multi-dimensional perception channels and symbol systems, we can achieve a dual improvement in information transmission efficiency and cognitive depth.

With the increasing development of modern science and technology, multimodal teaching methods are also

contributing to English teaching. By combining multimodal and task-based teaching methods, teachers can enhance students' English speaking abilities through multi sensory stimulation.

3. Methodology

Research Question

RQ: How does participation in TBL-based group work affect EFL students' perceptions of their collaborative learning skills before and after the intervention?

Null Hypothesis 4 (Ho): There is no significant difference in self-perceived Collaborative Learning Performance between the pre-intervention and post-intervention questionnaires for the experimental group.

Instruments

The group cooperation self-perception questionnaire

Participants

The participants of this study consisted of 56 Higher Vocational non-English major freshman students.

In multimodal task-based teaching, students' tasks are often completed through group work. In this study, the researcher conducted a multimodal task-based quasi-experiment intervention on the experimental students for 14 weeks. Conduct questionnaire surveys before and after intervention to investigate students' self-perceived group cooperative learning skills. How does participation in TBL-based group work affect EFL students' perceptions of their collaborative learning skills before and after the intervention.

4. Data Analysis and Discussion

Test of Normality

In quantitative data analysis, various statistical methods require the normal distribution of the sample data (Kwak & Park, 2019; Dong, 2023). In this part, the Paired Samples T-test assume that the data are in a normal distribution. Therefore, testing whether the data meets the normality requirement is vital. Before the normality test, the researcher cleaned the data, showing no missing values. 56 values from

the experimental group were valid for the pre- and post-intervention questionnaires.

The p-value of Shapiro-Wilk (commonly more than .05) was adopted for the normality test (Gonzalez-Estrada & Cosmes, 2019). Table 1 shows that the p-value of Shapiro-Wilk for the pre- intervention questionnaire of the experimental group is .738($p=.738$, $p>.05$); the p-value of Shapiro-Wilk for the post-intervention questionnaire of the experimental group is .252 ($p=.252$, $p>.05$). Two p-values are more than .05, showing that two data groups have a normal distribution.

The Shapiro Wilk test indicates that the data follows a normal distribution, thus satisfying the hypothesis of paired sample t-test. In addition, the large sample size ($N=56$) further supports the robustness of parameter testing.

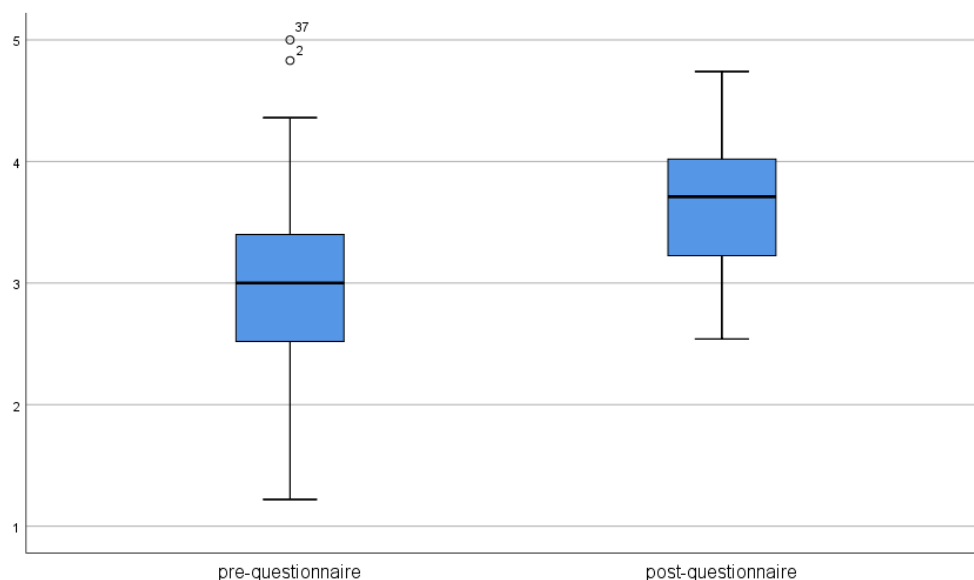


Figure 1. Box plot of the pre and post intervention questionnaires of EG

Table 2 shows the p-value of Shapiro-Wilk for the self-perceived collaborative learning performance score in the pre-intervention questionnaire. The p-values for its three dimensions at .066 ($p=.066$, $p>.05$), .280 ($p=.280$, $p>.05$), .399 ($p=.399$, $p>.05$). The p-value for the self-perceived collaborative learning performance score in the post-intervention questionnaire is that the p-values for its three dimensions at .210 ($p=.210$, $p>.05$), .073 ($p=.073$, $p>.05$), .071 ($p=.071$, $p>.05$). All the p-values are more than .05, showing that the data of the pre and post-intervention questionnaires have a normal distribution. The box plots in Figure 2 also indicate that the distribution of learners' self-perceived collaborative learning performance scores and three- dimension scores in pre- and post-intervention questionnaires is roughly normal.

As all p-values from the Shapiro-Wilk tests for both overall scores and sub-dimensions exceed 0.05, the assumption of normality is met, justifying the use of paired samples t-test. Therefore, the use of the paired samples t-test for subsequent inferential analysis is statistically justified.

Table 1. Tests of Normality of the pre- and post-questionnaires in EG

Tests of Normality						
	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	Df	Sig.
pre-questionnaire	.090	56	.200*	.986	56	.738
post-questionnaire	.092	56	.200*	.973	56	.252
*. This is a lower bound of the true significance.						
a. Lilliefors Significance Correction						

The box plot is commonly used to compare the distribution of the data, describing the shape of the distribution, variability, outliers, maximum value, minimum value, mean value, median value, lower quartile and upper quartile (Bhatnagar et al.,2021). The Box plots in Figure 1 also indicate that the distribution of the experimental group's pre-intervention questionnaire and post-intervention questionnaire is roughly normal.

Table 2. Tests of Normality of different dimensions of pre and post questionnaires in EG

Tests of Normality						
	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
pre engagement	.109	56	.097	.961	56	.066
pre accountability	.123	56	.034	.975	56	.280
pre satisfaction	.122	56	.038	.978	56	.399
post-engagement	.114	56	.068	.972	56	.210
post-accountability	.108	56	.157	.962	56	.073
post-satisfaction	.071	56	.200*	.961	56	.071
*. This is a lower bound of the true significance.						
a. Lilliefors Significance Correction						

This study also investigated the experimental group's self-perception of their collaborative learning performance and compared the results between the pre- and post-intervention surveys to answer Research Question. Following factor analysis in the pilot study, the self-perception questionnaire comprised 28 items across three dimensions: engagement, accountability, satisfaction. These dimensions are aligned with the three components (engagement, accountability, satisfaction) of collaborative learning performance, which are assessed in both the pretest and post-test. The self-perception

questionnaire was handed out twice during the pre- and post-intervention periods. The self-perception questionnaire scoring adopted a 5-point Likert scale rating. After collecting the responses, the researcher entered the scores into SPSS and computed them. The score for self-perceived speaking performance was calculated by summing the scores of all 28 items and then dividing by 28. This study used the arithmetic mean method to calculate standardized scores for each dimension: first, the scores of the 10 items on the participation

scale were summed and divided by 10 to obtain the self-perceived participation score; Next, sum up the scores of the 9 items included in the sense of responsibility and satisfaction scales, and divide by 9 to obtain the scores of self-awareness sense of responsibility and self-perceived satisfaction. This calculation method ensures that the scores of the three dimensions are converted into a unified comparability indicator, providing a standardized basis for subsequent data analysis.

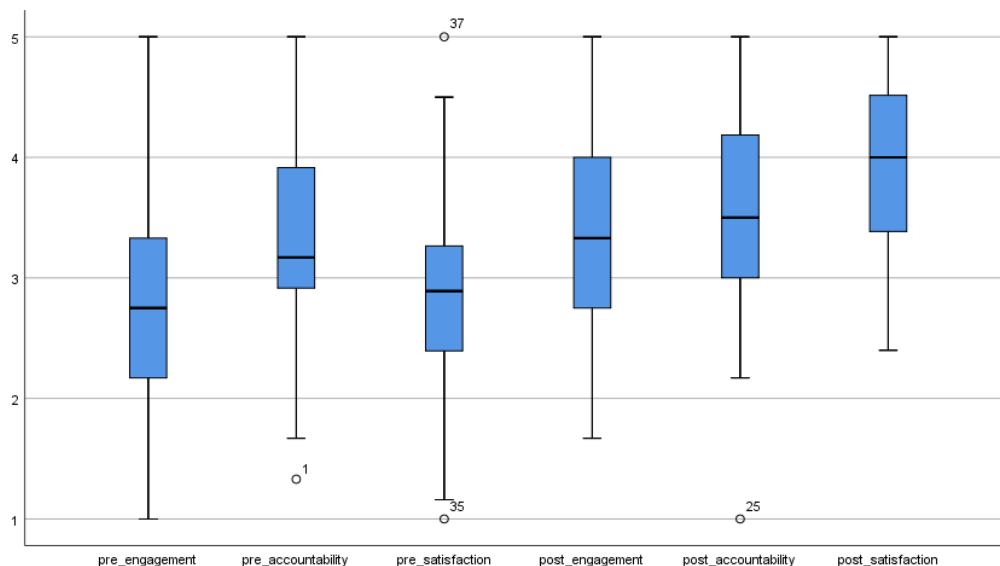


Figure 2. Box plot of different dimensions in the pre and post intervention questionnaires of EG

Table 3. Paired Samples Statistics

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Pair 1	3.63	56	.525	.070
	2.99	56	.806	.108

The researcher conducted a paired samples T-test to compare the scores of pre- and post-intervention questionnaires because the dependent sample (the experimental group) was measured twice at two different times, one during the pre-intervention period and the other during the post-intervention period (Mishra et al., 2019). As shown in Table 3, the paired samples T-test reveals that the mean score of the self-perceived collaborative learning performance in the post-intervention questionnaire (self-perceived collaborative learning performance_post) is 3.63 (M=3.63, SD=.525), while that (self-perceived collaborative learning performance_pre) in the pre-intervention questionnaire is 2.99 (M=2.99, SD=.806). The self-perceived collaborative learning performance score (2.99) in the pre-intervention questionnaire indicates that learners' self-perception was around the midpoint of the scale, suggesting that the experimental group exhibited lower confidence levels during the pre-intervention period and that there was room for improvement. The self-perceived collaborative learning performance score (3.63) in the post-intervention questionnaire indicates that learner self-perception was closer to the upper limit of the scale suggesting that the experimental group felt very confident and capable of facing group work tasks. The post-intervention mean self-perception score is much higher than that in the pre-intervention questionnaire, which shows that the integrated

TBL using Group work, demonstrated a substantially enhanced assessment of their collaborative learning performance. They believed they could do a better job than they could at the pre-intervention time. This indicates that there had been a significant improvement in learners' collaborative learning performance self-confidence after the intervention.

This improvement in self-perceived collaborative learning performance was further demonstrated by the mean difference and p-value in Table 4, which shows that the mean difference in self-perceived collaborative learning performance score between the pre-intervention and post-intervention questionnaires is .638 (SD=.717), with a significant level of .000 ($t=6.659$ $p<.05$) indicating that Null Hypothesis (H_0) is rejected and an alternative hypothesis is accepted and there is a significant difference. Moreover, the effect size for the pre- to post-test collaborative learning performance difference was Cohen's $d = 0.89$ indicating a large effect and confirming the practical significance of the intervention (Cohen, 1988). This considerable difference further demonstrated that students in the experimental group improved their collaborative learning performance to a significant degree.

Therefore, the difference in self-perceived collaborative learning performance scores between the pre-intervention and post-intervention questionnaires is significant and considerable. Additionally, it demonstrates that learners in the experimental group significantly improved their perception of their group work following the instructor's implementation of an integrated TBL using Multi-modal approach Instruction.

Table 4. Paired Samples Test

Table 4. Paired Samples Test								
	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1	.638	.717	.096	.446	.830	6.659	55	.000

Therefore, it can be interpreted that the implementation of the integrated instructional approach in the experimental group contributed to learners improving their collaborative learning performance and promoting their confidence in EFL speaking. The paired sample T-test also reveals the improvement in self-perceived collaborative learning performance from the three dimensions: engagement, accountability, satisfaction.

Table 5 shows that the mean self-perceived engagement score in the post- intervention questionnaire is 3.93 (M=3.93, SD=.720), much more than in the pre- intervention questionnaire at 2.89 (M=2.89, SD=.795). This change was further demonstrated by the mean difference of 1.045(MD=1.045) and the significant level of.000($t=8.861, p<.05$) in Table 6, indicating that this difference is statistically significant. The significant difference in the mean self-perceived engagement scores

indicated that after the intervention implementation, learners in the experimental group had a higher level of self-confidence in their engagement performance in group work. The effect size for the pre- to post-test engagement collaborative learning performance difference was Cohen's $d = 1.1$, indicating a large effect and confirming the practical significance of the intervention (Cohen, 1988). This considerable difference further demonstrated that students in the experimental group improved their engagement and collaborative learning performance to a significant degree.

Table 5. Paired Samples Statistics

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	post-engagement	3.93	56	.720	.096
	pre-engagement	2.89	56	.795	.106

Table 6. Paired Samples Statistics

Paired Samples Test								
		Paired Differences				t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
					Lower Upper			
Pair 1	post-engagement - pre-engagement	1.045	.88234	.11791	.80853	1.28111	8.861	.000

Table 7 shows the mean self-perceived accountability score in the post-intervention questionnaire, which is 3.59 (M=3.59, SD=.876), more than that in the pre- intervention questionnaire, at 3.26 (M=3.26, SD=.800). This change was further demonstrated by the mean difference of .330 (MD=1.209) and the significant level of .046 ($t=2.043, p<.05$) in Table 8. The p-value less than .05 means that this difference is statistically significant. The effect size for the pre- to post-test accountability collaborative learning performance difference was Cohen's $d = 1.1$, indicating a large effect and confirming the practical significance of the intervention (Cohen, 1988). This considerable difference further demonstrated that students in the experimental group

improved their accountability and collaborative learning performance to a significant degree.

This difference indicates that after the intervention implementation, the experimental group's confidence in their collaborative learning performance in the accountability was boosted.

Table 7. Paired Samples Statistics

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 2	post-accountability	3.59	56	.876	.117
	pre-accountability	3.26	56	.800	.107

Table 8. Paired Samples Statistics

Paired Samples Test								
		Paired Differences				t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
					Lower Upper			
Pair 2	post-accountability - pre-accountability	.330	1.209	.161	.006	.653	2.043	.046

Table 9 shows the mean self-perceived satisfaction score in the post-intervention questionnaire, which is 3.36 (M=3.36, SD=.847), significantly higher than in the pre-intervention questionnaire, which was 2.82 (M=2.82, SD=1.014). This improvement was further verified by the mean difference of .539 (MD=.539) and the significance level of.000 ($t=5.863, p<.05$) in Table 10. The p-value less than .05 means that this difference is statistically significant. The effect size for the pre- to post-test satisfaction collaborative learning performance difference was Cohen's $d = 1.1$, indicating a large effect and confirming the practical significance of the

intervention (Cohen, 1988). This considerable difference further demonstrated that students in the experimental group improved their satisfaction with collaborative learning performance to a significant degree. The generalizability of effect size in this study is influenced by sample size or instructional context.

This significant change in the mean self-perceived accountability scores displayed that after the intervention implementation, learners in the experimental group were more confident in their collaborative learning performance concerning accountability. They believed their collaborative

learning proficiency in English speaking had improved when they used TBL using group work Instruction.

Table 9. Paired Samples Statistics

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 3	post-satisfaction	3.36	56	.847	.113
	pre-satisfaction	2.82	56	1.014	.135

Table 10. Paired Samples Statistics

Table 10. Paired Samples Statistics									
Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 3	post-satisfaction - pre-satisfaction	.539	.689	.092	.355	.724	5.863	55	.000

5. Conclusion

From the above questionnaire results, students' self-perceived cooperative learning ability have been improved in three dimensions: participation, accountability, and satisfaction. It can be seen that the task-based teaching method using group work has an positive impact on students' self-perceived of cooperative learning ability.

References

- [1] Bhatnagar, V., Poonia, R. C., Nagar, P., Kumar, S., Singh, V., Raja, L., & Dass, P. (2021). Descriptive analysis of COVID-19 patients in the context of India. *Journal of Interdisciplinary Mathematics*, 24(3), 489-504.
- [2] Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd Ed.). Hillsdale, NJ: Lawrence Earlbaum Associates.
- [3] Dong, Y. P. (2023). The effect of flipped classroom approach on EFL university students' writing performance in Shandong Province China. Unpublished Doctoral Dissertation, SEGi University, Petaling Jaya, Malaysia.
- [4] Ellis, R. (2003). *Task-based research and language pedagogy*. Language teaching research. Oxford: Oxford University Press.
- [5] Gan, H. Q. (2022). The Application of Task Based Teaching Method in College English Oral Teaching Design. *Overseas English*.
- [6] González-Estrada, E., & Cosmes, W. (2019). Shapiro–Wilk test for skew normal distributions based on data transformations. *Journal of Statistical Computation and Simulation*, 89(17), 3258-3272.
- [7] Kwak, S. G., & Park, S. H. (2019). Normality test in clinical research. *Journal of Rheumatic Diseases*, 26(1), 5-11.
- [8] Mishra, P., Singh, U., Pandey, C. M., Mishra, P., & Pandey, G. (2019). Application of student's t-test, analysis of variance, and covariance. *Annals of cardiac anaesthesia*, 22(4), 407.
- [9] Willis, J. (1996). *A framework for task-based learning*. London: Longman.