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Impacts of AI-Enhanced LLS Instruction on the English Performance of College Underachieving EFL Learners

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Abstract: This study aims to investigate the impacts of LLS AI-enhanced LLS instruction on the English performance of college underachieving EFL learners. Language learning strategies (LLS) are crucial for English language learning, but few studies exist on LLS instruction for EFL underachievers, highlighting further research needs. This study investigates the frequency and preference of language learning strategies used by EFL underachievers and the impact in increasing their strategy application and English academic achievement. The research involved 450 Chinese EFL college learners and 40 Chinese EFL learners, using the Strategy Inventory for Language Learning (SILL), CET-4, and college English final exam. The results showed that underachievers perceived LLS instruction positively, improved their LLS application, and had a positive effect on their English learning skills and academic achievement. The study revealed the effect of LLS instruction and generated an efficient LLS instruction model on underachieving learners and made a useful attempt in the field of research on LLS of vocational EFL college learners. Further research may investigate the hidden influence factors of LLS use of college underachievers.

Keywords: Underachieving EFL Learners; AI-enhanced LLS Training; Language Learning Strategy (LLS); Vocational College
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1.Introduction

1.1 Research Background and Importance

The foremost objective of English education is to equip learners with strategies essential for the critical reconstruction, analysis, diff erentiation, and expansion of information to produce strategic insights [1]. Teaching language learning strategies is crucial for aiding students in enhancing their autonomy and self-control, has become a key focus in LLS studies as part of a new millennium strategy [2];[3] .The core principle of LLS teaching lies in the belief that equipping people with essential skills yields more substantial long-term advantages compared to merely addressing their immediate requirements temporarily. Put diff erently, merely supplying students with a response to an inquiry might restrict their inquisitiveness.The moment teachers respond to students, the immediate query is resolved; however, by instructing students in efficient language acquisition techniques that enable them to solve the questions independently, students might perceive themselves as influential in controlling their English language learning journey [4]. Additionally, this forms the essential prerequisite for the research. Khan and Khan emphasized the advantages of LLS teaching in enhancing English reading, speaking, vocabulary, and pronunciation.Educators ought to guide pupils through both overt and subtle methods of language acquisition.

A primary acknowledged issue is the extensive time and effort Chinese college students dedicate to learning English. Nonetheless, a persistent issue over the years is the insufficient understanding of effective English learning methods [5]; [6]. Consequently, students frequently confront the hurdle of ineffective language acquisition, in spite of their arduous tasks. Furthermore, numerous initiatives have been undertaken to formulate various theories, techniques, and approaches for language instruction, including the grammar translation method (utilizing books and worksheets for exercises, translation and memorization exercises, and cramming instruction), audiolingualism (using visual representations for role-playing, conversational activities, and games), and the communicative method (employing books, audio, and visuals for certain drills, memorization exercises), with just three of the most recognized and commonly employed methods [7]. Nonetheless, issues pertaining to student learning have been addressed as comparative neglect [8], with significantly less focus on the process of language development from the educational perspective.Despite significant research into language acquisition, considering the learner as part of the teaching/learning duo, it's often surprising that scholars generally overlook the importance of the learner's contribution [8]. Consequently, the objective of this research was to investigate the impact of LLS teaching on college students with lower-than-average vocational skills, by pinpointing an effective LLS teaching approach that enables them to autonomously manage and inspire their English education.

Nonetheless, a demographic disparity exists concerning EFL undercahievers in vocational schools. Earlier research has mainly concentrated on EFL students in primary and middle schools within standard classroom environments, investigating below-average EFL learners [9]. Tang's [10] research clearly shows a disregard for underperforming individuals. Furthermore, although Habók, Magyar, and Molnár [11] examined the impact of specific educational tactics on secondary schoolers, these results are not broadly applicable to English as a Foreign Language (EFL) environments. Likewise, research like Wyra and Lawson's [12], focusing on experimental strategy teaching, was confined to primary language environments and failed to sufficiently cater to the requirements of EFL students. Consequently, pinpointing efficient LLS tailored for those with low EFL vocational success is crucial to aid TESOL professionals in improving teaching quality and streamlining the educational journey for these learners.This extends past just attaining high grades, aiming to equip them for practical situations.Therefore, the research focused on examining the impact of LLS teaching on vocational EFL underachievers and addressing the previously mentioned gaps in the population.

1.2 Research Objectives

Ultimately, considering the previously stated deficiencies, this research intends to utilize practical philosophical foundations, LLS training models, and Gagné's theory of information processing to explore the impact of LLS instructions on vocational college students. According to the aforementioned theories, learning is perceived as a dynamic and ongoing process where learners choose from new information, store it in their long-term memory, and access it as needed [13]. Various elements present in a school or district, like proficiency in LLS and the presence of highly skilled educators, have a direct impact on student achievement.Additional elements outside the influence of educational institutions might encompass community safety. Moreover, vocational college-trained students serve as the primary providers of technical and technical skills, playing a crucial role in enhancing human capital quality, fostering industrial growth, and contributing to superior economic development [14]. Nonetheless, the performance level of the majority of English students in vocational schools is relatively low.English holds a crucial position in vocational training, signifying its immense importance to students in vocational fields. Then the research questions are displayed as follows:

RQ1: Does a notable correlation exist between AI-enhanced LLS instruction and the strategy application of EFL underachievers in the Chinese vocational college?

RQ2. Does a notable correlation exist between AI-enhanced LLS instruction and the English academic achievement of EFL underachievers in the Chinese vocational college?·

Research Methodology

It is important to note that a method design involves the use of both quantitative (questionnaire survey; quasi-experiment) and qualitative (semi-structured interview) approaches when conducting research, making it the most suitable approach to answering the research questions of the current study [15]. The study was conducted using a quantitative descriptive technique

in the first phase (quasi-experimental approach and questionnaire survey approach), and a qualitative descriptive strategy in the second phase (semi-structured interviews). More specifically, the results from the quantitative data (via Strategy Inventory of Language Learning (SILL), college English test-4 (CET-4), and college English final exam (CEFE)) are supposed to be explained and supported by the qualitative data (through Outline of semi-structure interview (OSIs)). The independent variable is LLS instruction, while the dependent variables are the strategy application and English academic achievement (EAA).

The first phase of the study was conducted via a quantitative descriptive approach, including quasi-experimental and questionnaire survey methods, while the second phase employed a qualitative descriptive approach through semi-structured interviews. Specifically, the qualitative data obtained from semi-structured interviews (OSIs) were intended to explain and support the findings from the quantitative data collected through the SILL, CET-4, and CEFE tests. In this empirical research, the quantitative data are given greater emphasis than the qualitative data [16]. Therefore, the primary conclusions of the study were drawn from both quantitative analyses and qualitative insights to reinforce the main findings. Additionally, data collection was conducted via online platforms of QuestionnaireStar, which facilitated sharing with instructor and students. SPSS 26 software was utilized for quantitative data analysis, while thematic analysis was employed to analyze the qualitative interview transcripts.

In this sub-section, the data analysis process is detailed, drawing from four research instruments: (1) the CET-4; (2) the SILL; and (4) the OSIs. The CET-4, and SILL were analyzed quantitatively, while the OSI interviews were analyzed qualitatively. Following a framework adapted from Creswell and Clark [17], quantitative data analysis involved presenting and interpreting statistical information through three types of data: descriptive statistics, frequency counts, and inferential statistics (including paired samples t-tests and Cohen' d).

3.Results and Discussion

To ensure the validity of the results, RQ1 and RQ2 was addressed using a mixed-methods approach. This involved a quantitative approach with the SILL questionnaire and a quasi-experiment, complemented by a qualitative approach using OSI questions to triangulate the data.

3.1 Findings and Analysis in Relation to RQ 1

To ensure the validity of the results, RQ2 was addressed using a mixed-methods approach. This involved a quantitative approach with the SILL questionnaire and a quasi-experiment, complemented by a qualitative approach using OSI questions to triangulate the data.

3.1.1 Results and Analysis of Quantitative Data

A Macro Comparison of the Level of Strategy Use: A comparison of students' levels of strategy use in experimental classes was conducted before and after the intervention. This comparison included memory, cognitive, compensatory, metacognitive, affective, social strategies, and overall strategy use. The analysis revealed significant differences in all seven areas of strategy use between the pre- and post-intervention phases. The research findings, which were detailed in Table 4.3, assessed the effect of the strategy training on the degree of strategy use among students in the experimental class.

A key finding in quantitative studies is the effect size; while the p-value indicates whether an effect exists, it does not provide information on the magnitude of the effect [18]. To address this, various statistical techniques offer a more precise estimate of treatment effects than relying solely on p-values. One such technique is Cohen's d, also known as the standard mean difference, which quantifies the size of differences between two interventions [19]. Cohen categorized effect sizes as "small effect" (d = 0.2–0.5), "medium effect" (d = 0.5–0.8), and "large effect" (d > 0.8), with d values typically ranging from -1.96 to 1.96. Consequently, this study employed Cohen's d to describe the statistical significance between the two groups.

Table 1 Comparison of strategy use pre-test and post-test of the experiment class

Strategy	Pre-test		Post-test		Variation	Significance	
	Means	SD	Means	SD		T-value	ES Cohen's d
Memory	2.44	0.4291	3.04	0.41	0.60	-5.4757	-1.4203
Cognitive	2.57	0.4467	3.13	0.51	0.55	-6.0011	-1.1505

Strategy	Pre-test		Post-test		Variation	Significance	
	Means	SD	Means	SD		T-value	ES Cohen's d
compensate	2.71	0.4521	3.29	0.46	0.68	-4.1125	-1.7508
Meta-cognitive	2.65	0.3697	3.28	0.43	0.64	-6.7473	-1.8687
Affective	2.68	0.3764	3.19	0.35	0.51	-7.093	-1.4311
Social	2.75	0.3739	3.28	0.40	0.53	-6.6314	-1.3713
Overall	2.63	0.4080	3.21	0.43	0.57	-7.3474	-1.3811

Note: SD=standard deviation; ES= effect size

As shown in Table 1, after one semester of the LLS intervention, learners in the experimental class exhibited a statistically significant increase in the use of memory, cognitive, compensatory, metacognitive, affective, and social strategies, as well as in the overall use of strategies. The differences between the two groups were statistically significant at the 0.01 level, with metacognitive strategies showing the greatest improvement, followed by social and compensatory strategies. Additionally, all test items demonstrated progress, with the improvement rate for each of the six strategies exceeding 0.50. This indicated a substantial enhancement in the degree of strategy use among learners in the experimental class following the LLS instruction. Furthermore, the effect sizes for all strategies, as indicated by Cohen's d values, were greater than 0.8, ranging from 1.15 to 1.88, signifying large differences between the experimental group's pre- and post-intervention scores.

Table 2 Comparison of strategy use pre-test and post-test of the control class

Strategy	Pre-test		Post-test		Variation	Significance	
	Means	SD	Means	SD		T-value	ES Cohen's d
Memory	2.48	0.0273	2.51	0.0288	0.03	-0.3126	-0.3887
Cognitive	2.56	0.0605	2.59	0.0605	0.03	0.0836	0.1239
compensate	2.70	0.0320	2.74	0.0345	0.04	-0.1434	-0.4988
Meta-cognitive	2.61	0.0151	2.65	0.0153	0.04	-0.0689	-0.2632
Affective	2.66	0.0076	2.68	0.0076	0.02	0.0576	0.3816
Social	2.73	0.0186	2.75	0.0185	0.02	-0.1321	-0.5606
Overall	2.62	0.0092	2.65	0.0088	0.03	-0.1352	-0.3888

Note: SD=standard deviation; ES= effect size

The statistical findings presented in Table 2, based on the SILL pretest and post-test data for the control group, revealed the following: 1) There was no significant difference in the levels of use of the six-dimensional strategies and the overall strategy between the control class before and after the experiment. All students in the control class failed within the "general use" category, with scores ranging from 2.5 to 3.4. 2) The variations in the use of memory, cognitive, compensatory, meta-cognitive, affective, and social strategies, as well as the overall strategy, were 0.03, 0.03, 0.04, 0.04, 0.02, 0.02, and 0.03, respectively. These differences indicated that changes before and after the experiment did not exceed 0.1, showing minimal change. Although there was an increase in the use of memory, meta-cognitive, compensatory, and social strategies, the magnitude of improvement was small, and these changes were not statistically significant (t-values of -0.3126, -0.1434, -0.0689, and -0.1321, respectively; the coefficient is considered significant if the t-value is greater than 1.96 or less than -1.96). Additionally, the effect sizes (ES) of the five strategies had Cohen's d values of less than 0.5, ranging from 0.38 to 0.49, which fell into the small effect size range (0.2-0.5), indicating that there were minimal differences in the control group before and after the intervention.

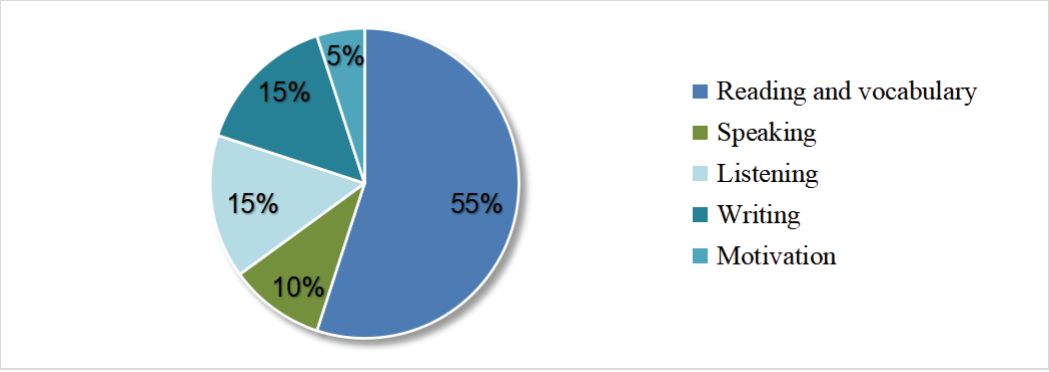
Table 3 Comparison of strategy use post-test of control and experiment classes

Strategy	Experiment group		Control group		Variation	Significance	
	Means	SD	Means	SD		T-value	ES Cohen's d
Memory	3.04	0.4092	2.50	0.0288	0.53	4.7497	1.8372
Cognitive	3.13	0.5127	2.57	0.0605	0.55	6.3145	1.5149
compensate	3.29	0.4581	2.73	0.0345	0.56	4.1125	1.7177
Meta-cognitive	3.28	0.4285	2.64	0.0153	0.64	7.8404	2.1092
Affective	3.20	0.3491	2.68	0.0076	0.52	7.6148	2.1040
Social	3.28	0.3981	2.75	0.0185	0.53	8.7218	1.8878
Overall	3.21	0.4259	2.62	0.0088	0.59	9.7435	1.9454

Note: SD=standard deviation; ES= effect size

According to the statistics presented in Table 3, after the experiment, students in the experimental class demonstrated significantly higher levels of strategy use across all six dimensions—including memory strategies—compared to students in the control class. All differences were statistically significant at the 0.01 level. Notably, social strategies exhibited the greatest difference with a variation of 1.01 points, followed by cognitive and metacognitive strategies, which showed differences exceeding 0.80 points. Affective and memory strategies also showed differences greater than 0.50 points, with the smallest disparities. Furthermore, the average mean of strategy use among the experimental group was higher by more than 0.5 points compared to the control group. The magnitude of these variations was substantial, and the differences were statistically significant, with t-values for the six strategies being 4.7497, 6.3145, 4.1125, 7.8404, 7.6148, and 8.7218, respectively. The coefficient was deemed significant when the t-value exceeded 1.96 or was less than -1.96. Additionally, the effect sizes for all strategies, as indicated by Cohen's d values greater than 0.8 and ranging from 1.17 to 2.10, underscored that there were large differences between the experimental and control groups following the intervention.

Figure 1 Specific LLS and its Use in Different Aspects



Based on Table 3 and Figure 1, 55% of interviewees indicated that they employed multiple LLSs for reading and vocabulary memorization; 15% used them for listening and writing, respectively; 10% applied them to English speaking; and 5% utilized them for motivational purposes. This suggested that learners who received LLS instruction could effectively use these strategies to enhance their English learning skills. The examples in Table 3 offer a summarized overview of original insights.

Figure 2 Micro comparison of strategy use post-test of the experiment class

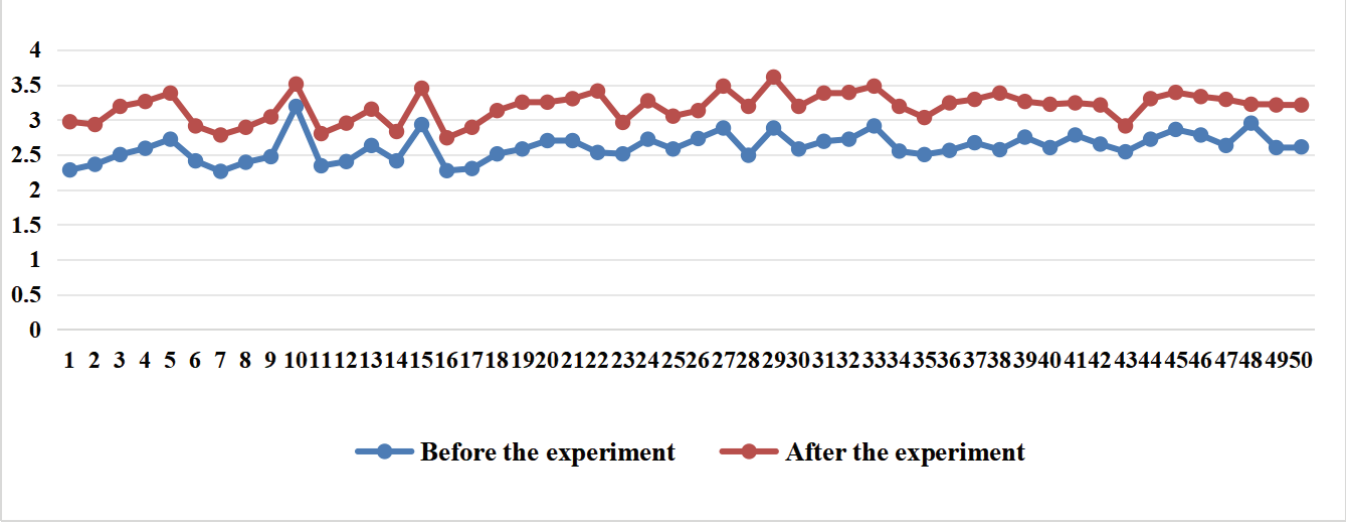


Figure 2 displays a micro-comparison of the post-test mean scores of strategy use. The mean values for the experimental group exhibited a parallel trend, fluctuating by nearly the same amount before and after the intervention program. Notably, after the LLS instruction, the experimental group experienced significant improvements and increases in strategy use, while the strategy use of students in the control class did not change significantly. The results of RQ1 clearly indicated that LLS training has had a cascading effect, significantly enhancing BA learners' strategy use and cultivating a strong sense of strategic awareness. The observed improvements in strategy use reflected the effects of the LLS instruction, demonstrating

its success in fostering greater engagement with learning strategies. These findings aligned with prior research by [20], which also reported substantial gains in strategy use among EFL learners following targeted strategy instruction. The consistency with previous studies underscored the robustness of the current study's outcomes.

Table 4 Coding process and results of sub-themes of OSIs

Sub-theme	Original Summarized Answers of Sub-themes
reading & vocabulary	55% of the interviewees believed that after learning LLS, they can sorted words and find key words in reading questions, using some strategies to memorize English words in reading.
Speaking	10% of interviewees stated that they utilized LLS, such as watching English movies, understanding English culture, asking for advice to improve speaking ability.
Listening	15% of interviewees stressed that pre-reading, pre-judging, replying LLS can help to improve accurate listening in English.
Writing	15% of interviewees believed that in order to enhance English writing abilities, they apply advanced words to the same words and improve memory and grasp in writing.
Motivation	5% of interviewees stated that LLS can track progress, set clear goals, and enhance the skills.
Positive effect	95% of interviewees believed that LLS training definitely affected the level of strategy use, as the effect is great. Specifically:
Negative effect	5% of interviewees state LLS had little effect on strategy use because he has learned these strategies before college and already familiar with them, there's a negative impact for him.
Positive effects	40% of interviewees believe that there are still some positive effects on the strategy use level. LLS training promoted the level of strategy use. Practice makes perfect.
Negative effects	55% of interviewees believe that the learning of LLS can significantly improve strategy use and accuracy rate, and faster completion time and higher correct rate.
	25% of interviewees considered that there is no effect because he has learned strategies for many times in my senior middle school, so he lost interest of them.
Completely mastered	30% of interviewees stated they mastered LLS completely and can use them correctly.
	50% of interviewees believed they have mastered most aspects of the LLS, but struggles with English language differences, such as recitation, listening, sentence, and grammar.
Partly mastered	15% of interviewees have made significant enhancements in LLS skills by understanding the basic general questions and using appropriate strategies.
Seldom	5% of interviewees believe they knew it in middle school but can't use it.
Positive effects	55% of interviewees stated The effect is great for English, which can improve learners' English skills because these strategies they haven't learned before.
Negative effect	35% of interviewees believed that LLS improves English question efficiency, reduces error rates, and increases interest in the subject, leading to improved performance if used wisely.
	5% of interviewees found that the impact and effect are not huge.

For the development of a model that effectively communicates these connections and the underlying logic, as illustrated in Table 4, it is essential to clarify the internal relationships between the core theme and its associated sub-themes. The examples offer a summarized overview of these original insights:

A04, A06, A09, A12, A20: Using LLS can better understand and comprehend questions. For example, in reading, read the question first, find key words, and then find the corresponding answer. First, look for the keyword in the question and then look at the original text to locate the correct answer.

A05: I used LLS, tracking progress in English, setting clear goals, and reading English articles and news simultaneously to enhance their skills.

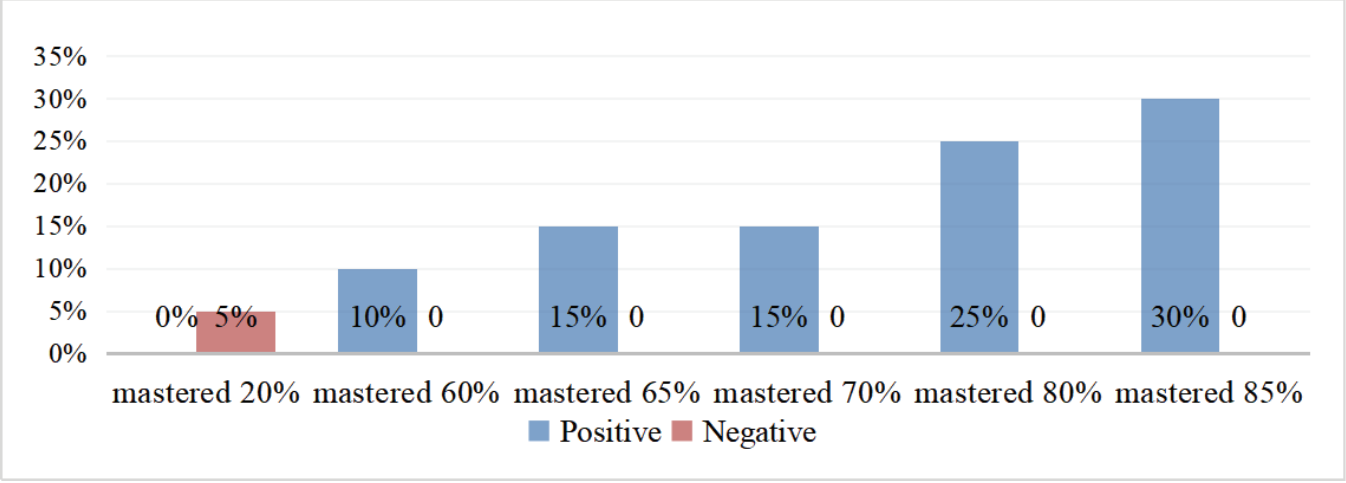
A08, A11, A17: Pre-reading, pre-judging, replying, and just a few of the LLS that can help us improve accurate listening in English.

A13, A18: Some LLSs were used, such as watching English movies, listening to dialogues, understanding the culture of English-speaking countries, and asking for pronunciation advice.

A04, A06, A07, A08, A15: The teacher's LLS instruction are designed to enhance effect in answering questions by providing a clear goal and strategy. This approach encourages relentless effort and self-discipline, enable individuals to answer questions correctly and achieve their goals.

A09: It is effective in improving English skills. But strategies like finding native English speakers and reading English independently are not beneficial for struggling students, as they may be difficult to engage with.

Figure 3 Degree of LLS Instruction on Affecting Level of Strategy Use



Based on the data presented in Table 4 and Figure 3, 95% of interviewees believed that LLS instruction had a substantial impact on the level of strategy use, indicating a significant effect. Specifically, 10% of the interviewees reported mastering 60% of LLS; 15% had mastered 65%; another 15% mastered 70%; 25% achieved mastery of 80%; 30% attained mastery of 85%; and 5% mastered 20%. These figures collectively suggested that LLS instruction effectively improved learners' levels of strategy use. The exception noted was an interviewee who had mastered only 20% of the LLS, attributed to prior extensive exposure to LLS during middle school, which led to a diminished interest and boredom with LLS instruction. The examples in Table 4.8 provided a summarized overview supporting these insights.

3.2. Findings and Analysis in Relation to RQ 2

During the pre-test phase, CET-4 scores were utilized to assess the learners' academic English achievement. Both quantitative and qualitative data were analyzed to evaluate the impact of LLS instruction on participants' CET-4 and CEFE scores. Following the LLS instruction program, both the experimental and control classes took the CET-4 and CEFE tests. The significance of the differences between the test scores was analyzed, and the results are presented in Table 5.

Table 5 Comparison of CET-4 pre-test and post-test of experiment class

Pre-test		Post-test		Variation	Significance	
Means	SD	Means	SD		T-value	ES Cohen's d
341.50	24.1565	365.43	29.7079	23.93	-3.9519	-0.8827

Note: SD=standard deviation; ES= effect size

As indicated in Table 5, following a semester of LLS instruction, learners in the experimental class exhibited a statistically significant increase in their English academic achievement, as measured by CET-4 scores. The difference between the two groups was statistically significant, with a t-value of -3.9519, which exceeded the critical thresholds of 2 and -2, confirming that the two groups were significantly different. The mean difference of 23.93 further underscored the substantial improvement in the EAA of learners in the experimental group after the intervention programme. Additionally, the effect size, represented by Cohen's d value of 0.8827, indicated a large difference in EAA between pre-test and post-test of the experimental group.

Table 6. Comparison of CET-4 pre-test and post-test of the control class

Pre-test		Post-test		Variation	Significance	
Means	**SD**	**Means**	**SD**		**t-value**	**ES Cohen's d**
342.15	18.0548	343.03	22.6450	0.88	-0.1911	-0.0427

As shown in Table 6, learners in the control class did not exhibit any statistically significant improvement in their academic English achievement (CET-4 score) following the LLS instruction. The difference between the two groups was statistically insignificant, with a t-value of -0.1911, which fell within the range of -2 to 2, indicating no meaningful difference before and after the experiment. Additionally, the mean variation was minimal at 0.88, further suggesting that the control group's EAA showed negligible improvement after the intervention programme. Furthermore, the effect size, represented by Cohen's d value of -0.0427, was less than 0.2, signifying that the differences in the control class before and after the intervention were quite modest.

Table 7 Comparison of CET-4 post-test between experiment and control classes

Experiment class		Control class		Variation	Significance	
Means	**SD**	**Means**	**SD**		**T-value**	**ES Cohen's d**
365.43	29.7079	343.03	21.5424	22.40	3.7926	0.8633

According to Table 7, after receiving LLS instruction, learners in the experimental class demonstrated a statistically significant improvement in their academic English achievement (CET-4 score). The t-value was 3.7926, which exceeded the threshold of 2, indicating a statistically significant difference between the experimental and control groups. The substantial mean variation of 22.40 further highlighted the significant improvement in the experimental group's academic English achievement following the intervention programme. Moreover, the Cohen's d effect size was -0.8633, surpassing the 0.8 threshold, underscoring the considerable significance of the differences between the experiment group and control group after the intervention program.

Table 8 Coding Process and Results of Sub-themes of OSIs

Sub-themes	Coding of Sub-Themes
Positive perceptions Negative perceptions	95% of interviewees stated LLS instruction definitely improved their English academic achievement, benefiting for exam, improving grammar, reading, listening, and vocabulary skills. 5% of interviewees indicated that LLS instruction has no significant improvement for his EAA because middle school teacher has taught LLS, similar strategies as current LLS, so he don't feel like it is changed much. He believes his English is under achieved is because vocabulary.
Positive perceptions Neutral perceptions Negative perceptions	85% of interviewees believe LLS instruction has an positive impact on their English academic achievement. LLS instruction has a short-term improvement; It strengthened English learning ability rather than rote memorizing words and sentences; It improved efficiency and accuracy of CET-4 test, saved time; It increased vocabulary by note-writing and guessing; It enhanced English reading and writing skills It provided a systematical comprehension of LLS. 5% of interviewees believe I think the effect to English academic achievement varies from person to person. LLS has a positive impact when using properly, a negative impact when misusing. In addition, some strategies are practical, while others are not useful. 10% of interviewees state it has negative impact because I have studied all LLS systematically and used LLS in middle school, but after I got to college, just felt like it was due to the poor vocabulary, so grade didn't improve much.
Positive perceptions Negative perceptions	95% of interviewees believe their English academic achievement has improved after LLS instruction. Before learning LLS, they learn English without strategy, but now use strategy in finishing questions, improving their accuracy and efficiency in English tests; After learning LLS, the most significant improvement is in listening accuracy, which can improve the ability to easily grasp simple words; It has significantly increased interest, awareness and motivation in English, boosted English grade. 5% of interviewee believed his English achievement is no significant change before and after learning LLS because he had learnt it in middle school and it didn't help him much in his college.

Sub-themes	Coding of Sub-Themes
Vocabulary	60% of interviewees stated the big challenge is small vocabulary, as they can employ memory strategies to assist to memorize words.
Reading	15% of interviewees indicated the main challenge is can't finish CET-4 reading questions, then use LLS skimming and find key words.
Motivation	5% of interviewees stressed the main difficulty is lack of motivation, confidence, and interest, as they use social and affective strategies to increase motivation significantly.
Writing	5% of interviewees stressed the challenge is writing a composition, as they use meta-cognitive and affective strategies, which is helpful to achieve CET-4 grade.
Speaking	5% of interviewees indicated the big challenge is poor English speaking, then he used social strategies to practice oral English.
Listening	10% of interviewees believed the big challenge is poor listening due to a lack of practice, then he used metacognitive and social strategies to practice.
LLS practice	65% of interviewees suggested learners should develop LLS skills and English abilities, do intensive practice of LLS with English questions, namely, theory plus practice.
Cooperation	5% of interviewees advised it is essential to communicate with others, ask questions, and find a partner to cooperate by using social strategies.
Motivation	30% of interviewees suggested to overcome fear of making mistakes in English learning, set a goal, encourage and motivate yourself, solving difficulties, rewarding yourself appropriately, and improving your affective strategies.

These codes represented the interviewees' perspectives and judgments regarding how LLS instruction impacts their academic achievement in English. It was evident that opinions varied among interviewees. While the majority believed that LLS had a positive effect on their academic performance, one participant felt it had a negative impact, and others thought the effect depended on the individual and the strategies used. This coding technique facilitated the classification of diverse viewpoints and details, providing a foundation for further analysis. Table 8 clarifies the internal relationships between the core theme and sub-themes, which is crucial for the development of the model as indicated.

In summary, LLS instruction significantly improved learners' EAA, enhancing their English learning attitudes, accuracy and efficiency in English tests, motivation, and cooperative learning. Specifically, after the intervention program (LLS instruction), the experimental group showed notable improvements in EAA, while the EAA of students in the control class did not change significantly. The results of RQ2 clearly indicated that LLS instruction has created a cascade effect, effectively boosting BA learners' English academic achievement. This has fostered a heightened sense of English learning awareness among them, underscoring the success and notable outcomes of the LLS instruction. These findings were consistent with [21], who found that strategy instruction positively impacted students' English proficiency, with higher-level students using strategies more frequently than lower-level students.

4.Conclusions and Future Research Directions

Overall, learners perceived LLS instruction positively, recognizing its benefits for strategy use. The instruction notably improved strategy use, with most participants achieving proficiency in various LLS components. Furthermore, LLS instruction had a positive effect on enhancing participants' English learning skills. The findings aligned with previous research [11]; [20], reinforcing the effectiveness of LLS instruction in educational contexts. The study also highlighted the potential for LLS instruction was a valuable tool in enhancing In general, an analysis of the relationship between LLS instruction and the level of strategy use among underachievers revealed the following: From both macro and micro perspectives, the difference of 0.5760 points in the level of strategy use among students in the experimental class before and after the intervention, and the 0.5860-point difference in the cross-sectional comparison between two groups after the intervention, demonstrated that LLS instruction significantly improved the strategy use of underachievers. This effect was notably significant. Specifically, students in the experimental class exhibited improvements in the use of cognitive, compensatory, metacognitive, and social strategies, with their use shifting from an average level before the experiment to a level of usual use afterward. This also supported the validity of LLS instruction, confirming that LLS training effectively enhanced the strategy use of underachievers.

The findings of RQs in this study were also consistent with several previous studies that found a significant positive relationship between the use of language learning strategies and academic achievements. Those studies indicated that students

who use strategies less frequently tended to make slower progress[11] ; [22]; [23]. The implications of RQ1 served as empirical support for the use and instruction of LLS, highlighting their effectiveness in enhancing below-average EFL learners' English achievement. Specifically, this emphasized the need to promote and integrate LLS instruction to help EFL students improve both their academic performance and strategy use.

The conclusion should be concise and engaging, clearly answering the research questions, summarizing the research process, making recommendations for future studies, and highlighting the study's contributions. This study employed a mixed-methods approach, incorporating a quasi-experiment, questionnaire surveys, and semi-structured interviews to provide empirical evidence on the effects of LLS instruction on below-average EFL learners in vocational colleges. It emphasized the impact of LLS instruction on learners' strategy use and English academic achievement. The results from the SILL survey revealed a total mean score of 2.63 for strategy use, indicating "usually not used" strategies. Specifically, meta-cognitive and cognitive strategies were the most frequently utilized, while memory strategies were used less often. These findings were consistent with previous research indicating that compensation, social, and metacognitive strategies were used effectively, whereas memory strategies were less effective [12]; [24]; [25].

The study provided empirical evidence that LLS instruction enhanced the language strategy use and English academic achievement of vocational underachievers. The results aligned with previous research and suggested that a mixed model of LLS instruction was particularly beneficial for underachievers. Additionally, LLS instruction was found to improve learners' English learning motivation, attitudes towards strategy use, mastery of LLS, and the accuracy and efficiency of English tests, as well as overall English learning skills. These findings corroborated earlier studies [11]; [26]; [27]. The research underscored the significance of LLS instruction in teaching practice, demonstrating its positive impact on the EAA of underachievers. The study's results aligned with the goals of the SDGs (Sustainable Development Goals), contributing to EFL education by offering insights into effective strategies for enhancing the English learning of vocational students.

Finally, the study employed both qualitative data, analyzed through thematic analysis, and quantitative data to develop a mixed-method LLS instruction model for EFL vocational underachievers. This model incorporated five LLS instruction methods and several stages: presentation, raising awareness, guided practice, independent practice, and evaluation. The findings aligned with those of previous research [28]; [29]; [30]. The LLS instruction model and implementation framework proposed in this study may provide valuable references for reforms in college English teaching theory, offering new theoretical perspectives on effective LLS instruction models. Future research can explore LLS instruction across various factors, including learners' awareness, motivation, learning styles, attitudes, abilities, and philosophies. Additionally, future studies should focus on online LLS teaching approaches and their impact on underachievers.

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References

[1] M. Evangelin Arulselvi, "Learning Strategy Training in English Teaching," i-manager's Journal on English Language Teaching, vol. 6, no. 1, p. 1, 2016, doi: https://doi.org/10.26634/jelt.6.1.4805.

[2] R. L. Oxford, Language learning strategies : what every teacher should know. Boston: Heinle, 1991.

[3] A. D. Cohen, Strategies in learning and using a second language. Londres ; New York: Routledge, 2014.

[4] C. Griffiths, The Strategy Factor in Successful Language Learning. Multilingual Matters, 2018.

[5] A. Habók and A. Magyar, "The Effect of Language Learning Strategies on Proficiency, Attitudes and School Achievement," Frontiers in Psychology, vol. 8, Jan. 2018, doi: https://doi.org/10.3389/fpsyg.2017.02358.

[6] W. Guo and B. Bai, "Effects of self-regulated learning strategy use on motivation in EFL writing: A comparison between high and low achievers in Hong Kong primary schools," Applied Linguistics Review, vol. 0, no. 0, Jul. 2019, doi: https://doi.org/10.1515/applirev-2018-0085.

[7] J. A. Matamoros-González, M. A. Rojas, J. P. Romero, S. Vera-Quiñonez, and S. T. Soto, "English Language Teaching Approaches: A Comparison of the Grammar-translation, Audiolingual, Communicative, and Natural Approaches,"Theory and Practice in Language Studies, vol. 7, no. 11, p. 965, Nov. 2017, doi: https://doi.org/10.17507/tpls.0711.04.

[8] H. L. Smith, "Making sense of Bad English: an introduction to language attitudes and ideologies," Journal of Multilingual and Multicultural Development, pp. 1-3, Mar. 2022, doi: https://doi.org/10.1080/01434632.2022.2056973.

[9] N. Ali Raza and C. Coombe, English language teaching in Pakistan. Singapore: Springer, 2022. pp. 245-259.

[10] L.-H. Tang, "The Effects of Metacognitive Strategy Training for College Language Low Achievers," DEStech Transactions on Social Science, Education and Human Science, vol. 17, no. 23, pp. 45-58. Mar. 2018, doi: https://doi.org/10.12783/dtssehs/icaem2017/18961.

[11] A. Habók, A. Magyar, and G. Molnár, "Investigating the Relationship Among English Language Learning Strategies, Language Achievement, and Attitude,"Frontiers in Psychology, vol. 13, pp. 128-132. May 2022, doi: https://doi.org/10.3389/fpsyg.2022.867714.

[12] M. Wyra and M. J. Lawson, "Foreign language vocabulary learning using the keyword method: strategy and meta-strategy knowledge,"The Language Learning Journal, vol. 46, no. 5, pp. 605–621, Aug. 2018, doi: https://doi.org/10.1080/09571736.2018.1503138.

[13] Ane Qvortrup, Merete Wiberg, Gerd Christensen, Mikala Hansbøl, and Danish Council For Independent Research (Culture And Communication, On the definition of learning. Odense: University Press Of Southern Denmark, 2016. pp. 58-60.

[14] X. Wang, C. Jian, and D. Wang,"The Career Adaptability of Vocational College Students in Western China," Journal of Research in Vocational Education, vol. 5, no. 3, pp. 56-78. Mar. 2023, doi: https://doi.org/10.53469/jrve.2023.05(03).07.

[15] J. W. Creswell, Research design: Qualitative, quantitative, and mixed methods approaches, 4th ed. London: Sage Publications Ltd, 2014, pp. 121-124.

[16] Alenka Braček Lalić and D. Berberović,"Research Methodology,"Springer eBooks, pp. 5–15, Jan. 2021, doi: https://doi.org/10.1007/978-3-030-65451-1_2.

[17] J. W. Creswell and V. L. Plano Clark, Designing and conducting mixed methods research. Los Angeles: Sage, 2017.

[18] G. M. Sullivan and R. Feinn, "Using effect size—or why the p value is not enough," Journal of Graduate Medical Education, vol. 4, no. 3, pp. 279–282, Sep. 2012, doi: https://doi.org/10.4300/JGME-D-12-00156.1.

[19] B. Huang, L.-J. Wei, and E. B. Ludmir, "Estimating Treatment Effect as the Primary Analysis in a Comparative Study: Moving Beyond P Value,"Journal of Clinical Oncology, vol. 38, no. 17, pp. 2001–2002, Jun. 2020, doi: https://doi.org/10.1200/jco.19.03111.

[20] Z. Gavriilidou, and A. Papanis, "The effect of strategy training on strategy use by Muslim pupils learning English as foreign language, " Journal of Applied Linguistics, vol. 25, no. 1, pp. 47-63, Jun. 2009.

[21] M. Wyra and M. J. Lawson, "Foreign language vocabulary learning using the keyword method: strategy and meta-strategy knowledge," The Language Learning Journal, vol. 46, no. 5, pp. 605–621, Aug. 2018, doi: 10.1080/09571736.2018.1503138.

[22] A. Oflaz,"The Effects of Anxiety, Shyness and Language Learning Strategies on Speaking Skills and Academic Achievement," European Journal of Educational Research, vol. 8, no. 4, pp. 99-101, Oct. 2019, doi: https://doi.org/10.12973/eu-jer.8.4.999.

[23] C. Griffiths and R. L. Oxford, "The twenty-first century landscape of language learning strategies: Introduction to this special issue," System, vol. 43, pp. 1–10, Apr. 2014, doi.org/10.1016/j.system.2013.12.009.

[24] C. Jiao, M. Ganapathy, and H. Chang, "A Comparative Study of Language Learning Strategies Use Between High and Low EFL College Achievers," International Journal of Academic Research in Progressive Education and Development, vol. 12, no. 2, pp. 607–620, May 2023, doi.org/10.6007/IJARPED/v12-i2/17002

[25] K. Hong-Nam and A. G. Leavell, "A comparative study of language learning strategy use in an efl context: Monolingual korean and bilingual korean-chinese university students," Asia Pacific Education Review, vol. 8, no. 1, pp. 71–88, Apr.

2007, doi: https://doi.org/10.1007/bf03025834.

[26] Alfian, M. Wyra, and M. Rossetto, "Language Learning Strategy use by Prospective English Language Teachers in Indonesia," SensePublishers eBooks, pp. 95–104, Jan. 2016, doi: https://doi.org/10.1007/978-94-6300-672-9_10.

[27] F. Salahshour, M. Sharifi, and N. Salahshour, "The Relationship between Language Learning Strategy Use, Language Proficiency Level and Learner Gender," Procedia - Social and Behavioral Sciences, vol. 70, pp. 634–643, Jan. 2013, doi: https://doi.org/10.1016/j.sbspro.2013.01.103.

[28] A. D. Cohen and C. Griffiths, "Revisiting LLS Research 40 Years Later," TESOL Quarterly, vol. 49, no. 2, pp. 414–429, Apr. 2015, doi: https://doi.org/10.1002/tesq.225.

[29] A. U. Chamot, and V. Harris, Learning Strategy Instruction in the Language Classroom. Bristol: Multilingual Matters. 2019. doi: https://doi.org/10.21832/9781788923415.

[30] S. Mahmood, "Instructional Strategies for Online Teaching in COVID-19 Pandemic," Human Behavior and Emerging Technologies, vol. 3, no. 1, pp. 199–203, Sep. 2020, doi: https://doi.org/10.1002/hbe2.218.