

Research paper

The Effectiveness of Reading Comprehension and Vocabulary via Cognitive Strategies across Gender

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Abstract

This study aims to find out the meaningful effect of employing cognitive strategies instead of traditional methods on reading and vocabulary as a change for today's educational system at high school. To inflame the interest of collaborating teachers who are not aware of differences between male and female ability and so as to fill the gap between vocabulary and reading comprehension, the current researcher set to examine the impact of employing cognitive strategies on reading and vocabulary learning achievement across gender. To do so, 64 male and female subjects from a total of 90 intermediate participants were homogenized through the Nelson proficiency test in four classes as 32 experimental and 32 control group. Then pretest and posttest were administered to both groups. The procedure lasted for 2 months and 16 sessions. The experimental groups received instruction as treatment regarding cognitive learning strategies (summarizing, note-taking, and re-reading) respectively, whereas the control groups received conventional instruction on the basis of their textbook. The results of the Wilcoxon run on the gained scores rejected the null hypotheses of the research saying that cognitive strategies have no effect on EFL learners' vocabulary and reading comprehension, as well as, showing no difference across gender. The study implies that the researchers find it helpful to see the bridging gap between vocabulary and reading comprehension by the cognitive strategies.

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Introduction

Strategies offer exciting possibilities to create vast opportunities for student learning. To enhance students reading ability and vocabulary based on strategy, a student needs to employ

language learning strategies. Using strategies assists learners in reducing anxiety that debilitates comprehension in reading text and vocabulary.

It is not an exaggeration to say that integrated instruction and differentiated methodologies are instrumental in developing student integration and academic progression: “It is a professional responsibility to stimulate students’ interest in curricula and motivate students to learn differentiated strategies. Reading and vocabulary understanding are traditionally connected. They can be learned for different objectives” (Suprayogi et al., 2017).

This study is an attempt to investigate whether cognitive strategies have any effect on Iranian intermediate regarding their promoting reading comprehension ability and their learning vocabulary of EFL learners or not. In addition, the current research tries to find out if there is any significant difference between Iranian intermediate EFL learners regarding their promoting reading comprehension and their learning vocabulary or not.

This research reports on the finding of the study that aims to understand the way in which cognitive strategy can help improve students reading comprehension ability and vocabulary across gender. The role of learning cognitive strategies is an important factor in EFL learners' success and investigating learners' opportunities in promoting their reading comprehension and internalizing their vocabulary is the paramount aim of this study. This study also investigates whether there is any significant difference between Iranian male and female intermediate EFL learners regarding their promoting comprehension ability and their learning vocabulary or not.

The present study will investigate the pedagogical effectiveness of cognitive strategies on reading comprehension and vocabulary across gender in comparison with the traditional ways of conventional instruction (C I) based on the exercises in their regular textbook. In cognitive strategies, language learning is considered to be a meaningful process whereby students use their cognition to discover the rules of the language they are learning.

In order to achieve the purpose of this study the following research questions were proposed:

Q1: Does the use of cognitive strategies has any effect on Iranian intermediate EFL learners regarding their promoting reading comprehension ability?

Q2: Is there any significant difference between Iranian male and female intermediate EFL learners regarding their promoting reading comprehension ability?

Q3: Does the use of cognitive strategies has any effect on Iranian intermediate EFL learners regarding their learning vocabulary?

Q4: Is there any significant difference between Iranian male and female intermediate EFL learners regarding their learning vocabulary?

In line with the preceding questions, the following null hypotheses were formulated:

Ho1: Using cognitive strategies has no effect on Iranian intermediate EFL learners regarding their promoting reading comprehension ability.

Ho2: There is no significant difference between Iranian male and female intermediate EFL learners regarding their promoting reading comprehension ability.

Ho3: Using cognitive strategies has no effect on Iranian EFL learners regarding their learning vocabulary.

Ho4: There is no significant difference between Iranian male and female intermediate EFL learners regarding their learning vocabulary.

Literature Review

Scholars, in different fields of education relevant to language teaching and learning, have been investigating the significance of the reading skill in acquiring a second language. A good proof for this claim can be numerous studies done by researchers like (Anderson, 2016; Anderson & Fincham, 2014; Anderson & Tension, 2016; Elleman & Oslund, 2019; Soto et al., 2019; Tang & Ponser, 2014).

Educational reform calls for a shift or movement from traditional learning style to a newer progression of using strategies in the educational environment in which bring improvement through meaningful projects (Anderson & Tension, 2016; Carpenter & Olson, 2012; Lucas, 2020). Applying strategies enhances student acquisition. From the beginning of the strategy in use era, educational researchers and practitioners have told us that strategy use to be successful in our schools and it needed to be closely tied to school reform. In order to clear out the fact, it is better to be defined well (Anderson & Tension, 2016; Ghaedi & Shahrokhi, 2016).

Hung (2014) found that meta-cognitive strategies have a positive correlation with learners reading comprehension. Alternative taxonomies have been offered by O'Malley, Chamot (1990), and others including cognitive strategies, meta-cognitive strategies, memory-related strategies, compensatory strategies, affective strategies, social strategies, in which cognitive strategies to be considered the focal point of the present study so as to improve reading comprehension and vocabulary learning ability of the students across gender. In this way, they build more confidence and are more knowledgeable in their work.

Anderson and Tenison (2016) studied the phases of learning strategies in which skill acquisition, impacts cognitive processing. Participants go through 3 stages of learning when solving a problem. Three phases as encoding, solving, responding. Each cognitive stage is associated with a unique brain signature and using a bottom-up approach duration of the stage can be identified. For the top-down approach, a model of the cognitive stage is simulated and defined how they change over the course of learning. Finding obtained by the study revealed that the solving stage of the first learning phase is long and involve a sequence of arithmetic computations. Potential companies go to the second stage of learning when they can respond to retrieve, thereby drastically reducing the duration of the solving stage. With continued practice, participants then go to the third learning phase when they recognize the problem as a single unit produce the answer as an automatic response. The duration of this third learning phase is dominated by the responding stage.

The findings of Ranjan et al. (2021) are consistent with this, who argued that successful learners are good strategy users which are defined as knowing a lot of strategies and transferring them readily and appropriately to the new setting. Jung et al. (2019) asserted that students with higher records of academic achievement have been found to use more language learning strategies and monitor their learning process more flexibly than less successful learners.

In previous studies, all attempts were given to one area of the study. The study on reading comprehension or vocabulary has two separate parts. Few studies have been focused on both cases of the studies. While the present research can fill this gap. It can bridge a gap between reading comprehension and vocabulary.

Methods

Population and Sampling

The present study intended to examine the impact of cognitive strategies on both vocabulary and reading comprehension on Iranian high school EFL learners in relation to their genders in Safarpour high school and Osveh institution in Iran. The participants included 40 female and 24 male students from a total of 90 subjects who were at the intermediate level and between the age ranges of 14-16 years old regarding the Iranian high school aging criterion. Almost some of the students had some experience of learning English in different private English institutes. The learners were not much familiar with employing cognitive strategies and related matters. The researcher secured the homogeneity of the participants through the application of the Nelson proficiency test (NPT). The 64 homogenized participants 40 female and 24 males were randomly assigned into 32 experimental group and 32 control group.

The sample is more likely to be representative of the population. Therefore, the researcher selected the participants based on the availability sampling procedure, hence the study used which was convenient sampling.

Instrumentations

In this study, two different instruments were used for collecting the needed data. The first one was 50 items of the Nelson Proficiency Test (NPT), and the second one was 30 items of a researcher-made test administered as pre-test and post-test. They are described as below.

The process involved administering the pre-validated vocabulary and reading comprehension test to both control and experimental groups to measure the entry behaviour of the participants with respect to the variables of this investigation which is the vocabulary and reading comprehension test regarding the three cognitive strategies (summarizing, re-reading and note-taking). After the experiment, the participants took the post-test which was identical to the pre-test.

Data Collection and Procedure

The data collection process of this study started in January 2016. Sixteen sessions took place in the students' classroom and each was about 45 minutes on reading and vocabulary period. It lasted for two months and covered two instructional units from the pre-university English book four. The researcher had two sessions to collect data every week. To achieve the purpose of the study, the subsequent steps including 4 phases were carried out during the research progression.

Phase 1: Convenient Selection

In the first phase, 64 students who were studying at intermediate high school were selected from among a total population of 90 as the participants of the present study. The convenient selection procedure began with administering a Nelson proficiency test (NPT). After test administration and statistical calculations of its obtained data, the students were divided into two groups and assigned to the experimental and control groups. In order to investigate the effect of each treatment separately, the same participants had two performances on reading comprehension and vocabulary, and two paired samples t-tests were run on the pretest and posttest scores in the reading comprehension and vocabulary groups. The second and fourth research questions attempted to examine whether gender made any significant differences in learning vocabulary and reading comprehension regarding employing cognitive strategies. In the second phase, 24 male participants were selected as moderator to examine any significant difference between males and females.

Phase 2: Pre-testing

The process involved administering the reading comprehension and vocabulary test to both experimental and control groups to test the initial knowledge of the participants of the study prior to the implementation of treatment. In other words, the researcher wanted to measure the extent of the participants' word knowledge and reading comprehension before the treatment. The test was constructed by the researcher by selecting different items from students' textbooks (the English book of grade four of the pre-university book) regarding three cognitive strategies (summarizing, re-reading, and note-taking) which were utilized in the process of the research. The test included a list of 30 items on reading comprehension and vocabulary from 2 lessons from the textbook. The first 15 questions were multiple-choice questions and the students ought to choose the best vocabulary for the blanks in the sentences from among the choices provided. The second 15 questions included a reading comprehension test (15 multiple-choice items in two passages). The vocabulary and reading comprehension were selected with respect to the uncovered materials presented in these lessons.

Since the test items had been developed by the researcher, it was expected to meet the criteria of a standard test, including the validity and reliability of this test. To get convinced about the validity and reliability of this test, the researcher piloted it. Having established the mentioned characteristics, she administered it to both the experimental and control groups as the pre-test. Subsequently, the obtained results were collected and analysed as a source of data to confirm the rate of participants' vocabulary and reading comprehension so as to fill the gap

between the vocabulary and reading comprehension, as well as to verify the initial differences existing between the groups.

Phase 3: Instruction

The experimental groups received two treatment conditions for their instruction. The treatment condition was comprised of teaching materials based on giving instructions regarding the cognitive strategies (summarizing, re-reading, and note-taking) respectively on reading comprehension and vocabulary knowledge so as to bridge a gap between vocabulary and reading comprehension. The participants in the experimental group with explicit instruction were instructed to use the cognitive strategies while engaged in classroom reading activities. Firstly, the teacher explained the strategies. Then the teacher modelled the strategies demonstrating what the strategy application would look like. The participants received explicit instruction on the use of strategies and subsequently were asked to practice verbalizing the learned strategies in order to raise their awareness of the strategies more. The researcher supported this type of learning by raising individual strategies used to increase conscious awareness through engaging, questioning, prompting, modelling, explaining, telling, challenging, reflecting, clarifying, leading. In other words, strategy instruction brings to conscious attention and awareness what readers do as they construct meaning. The note-taking strategy defines as writing down keywords and concepts in abbreviated verbal, graphic, or numerical forms while reading or listening. It helps them remember information and becomes one of their study aids. It is represented by two strategies: re-reading a sentence or a text to remedy failures. Re-reading and note-taking relate to surface cognitive strategies. The deep cognitive strategy is summarizing. It helps students analyse information in a text and generate the information by integrating new information with existing knowledge. The other important techniques which are similar in use, include re-telling or verbalization of words, and visualization which is similar to re-reading. They can be considered as an important tool for the augmentation of vocabulary and comprehension. In order to clarify the procedure of this study, it would be helpful to have a brief overview of the content and organization of the employed program in this study, then go through the treatment overview.

Instruction for the Experimental Group

The researcher initiated the instruction with a brief introduction to the cognitive strategies and giving some explanation of the guidelines of employing them. The purpose of this phase of instruction was to prepare the students to do the activities successfully so that the instruction would be covered with the research period. Therefore, two sessions were devoted to teaching about using strategies on reading comprehension and vocabulary. In order to achieve a better outcome, the participants were divided into four groups. The instructor involved the students in reading and vocabulary of English book four and mentioned that these two sections of the textbook are the kernel section of the book. Accordingly, the present study used English book four as the teaching material for the participants of the study. The book also was employed in making the pre-test and post-test items. The instructor tried to provide the conditions to motivate learners and to develop active participation of them during the teaching process. While the instructor was presenting the lesson, she referred to using strategies.

The activities performed during the teaching/learning process and instructed through verbalization of vocabulary techniques as a meaningful way of mastering the strategies. The teacher that was the researcher of the current study wrote the vocabulary on the board and asked students to re-read or repeat it a few times. Then, she presented the synonyms and antonyms and asked students to take-note. Moreover, she told the real meaning (correct equivalent for every vocabulary) in the target language as a last resort. The teacher would contextualize the new vocabulary for students, and finally, for the reading comprehension part of the lesson, she read the reading passage and asked the students to employ summarizing strategy so as to enhance their lesson for reading comprehension of the lesson.

Having been taught each lesson, the learners had to create their artifacts on a piece of paper based on the covered materials. The teacher would receive their homework at the end of the class and would check at home. There was good interaction between student-teacher and student-student. The participants had the opportunity to review and revise their homework two or three times and give help to each other.

Instruction for the Control Group

The control groups received the instruction in a traditional way. The instruction was comprised of teaching materials with the textbook, English grade four, without employing three variables of cognitive strategies (re-reading, note-taking, and summarizing). In other words, the control groups who received the conventional instruction (CI) method followed an individualistic instructional approach based on the exercises in their regular textbooks. The conventional way of reading comprehension based on presentation, practice, and production (PPP) strategy is a popular reading comprehension procedure in EFL classrooms (Celce-Murcia, 2001; Shteingart et al., 2015; Taylor & Fong Kan, 2021). The content of the book was the same as the experimental groups' textbook. For the control group, the materials were thought through the instructional teacher-centered method, and assignments were completed by pen and paper in the classroom.

Phase 4: Post-testing

After the experiment, the participants took the post-test. To check the effectiveness of the treatment and to observe the differences between the experimental and control groups, the researcher administered the post-test for both groups. The post-test was the same as the pre-test. The normality of the test was calculated through the Shapiro-Wilk method which turned out to be ($p < .05$). The internal consistency of the test was measured through the Mann-Whitney U test, and the validity of the post-test was checked by the same professors who checked the pre-test.

Design

This study can be quasi-experimental research with a pretest-posttest control group design. The participants of the study were conveniently assigned into two groups as experimental and control groups. The effect of employing cognitive strategies (re-reading, note-taking, and summarizing), were independent variables, and filling the gap between learning vocabulary

and reading comprehension were dependent variables. The participants consisted of two different classes of 32 students intermediate high school students in grade four. One of the classes was conveniently assigned as an experimental group (n=32), and the other was conveniently assigned as the control group (n=32). In the control group (traditional group) students were taught through the conventional instruction (CI) method, in a teacher-centered instructional method followed an individualistic instructional approach based on the exercises in their regular textbooks. Whereas in the experimental group (group using cognitive strategies) students were subjected to the learner-centered method. Moreover, the research included 24 males sub-group as a moderator that was compared with than female main groups so as to study the significant differences between them. The representation of the research design after achieving homogeneous subjects is displayed in Table 1 as a schematic representation of the design of the study.

Statistical Analysis

In this study, statistical analysis consisted of descriptive statistics and inferential statistics. Through the descriptive analysis, the mean and standard deviation of the participant's scores on pre-test and post-test were estimated. The normality of pre-test and post-test were measured through the Shapiro-Wilk test and Mann-Whitney U test method, for the internal consistency of the test. To recognize the validity of this test, the researcher asked three professors of applied linguistics to check whether the items would adequately capture the concept they were going to measure. One Levene's test is used to compare the quality of variance of two main groups before the treatment. By using an independent sample t-test test, the researcher could approve that the two main groups were homogeneous. Then one T-test was run to compare the mean score of the four groups before the treatment. In order to test the null hypothesis of the study, the researcher ran Wilcoxon through the application of SPSS version 18 software.

Results

The Result of the Nelson Test Used as the Homogeneity Test

In order to have homogenized participants of the two groups in terms of their general English language proficiency, the Nelson language proficiency test (PET) was administered to 90 students. To investigate the homogeneity of the groups the researcher used an independent sample t-test. The result of the descriptive analysis for the Nelson test is displayed in the following Table 1. In the table below the mean scores, the number of the participant and standard deviation are represented.

Table 1

The Descriptive Statistics of the Nelson Scores

N	Valid	90
	Missing	0
Mean		39.9667
Std. Deviation		6.47632
Variance		41.943
Minimum		18.00
Maximum		50.00

Out of the 90 participants, 64 were considered homogenous members based on one standard deviation above and below the mean (39.96+/_ 6.47). The homogenized participants were assigned into two groups of control and experimental based on odd and even numbers (N= 32).

Table 2

Result of the Independent T-Test for the Comparison of the Control and Experimental Groups

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Homogenized	Equal variances assumed	.086	.872	.157	62	.876	.12500	.79799
	Equal variances not assumed			.157	61.936	.876	.12500	.79799

The table above indicates that the mean difference is .12500 and the standard error difference is 79799. It is shown in the table that the hypothesis of equal variances is approved because the sig. is .876 which is higher than $\alpha=.05$. As Table 2 above shows, the control and experimental groups were homogeneous in terms of language proficiency, $t_{157, df(62)} = .876$ sig., $p>.05$.

Table 3

Result of Normality Test for the Comparison of the Control and Experimental Groups

	Group_Con_Exp	Shapiro-Wilk		
		Statistic	df	Sig.
Homogenized	Control	.983	32	.876
	Experimental	.975	32	.648

As it can be seen in Table 3 above (the result of the Shapiro-Wilk test), the data are normally distributed for the two sets of scores ($P>.05$) p is higher than .05. Therefore, the independent t-test was used for comparison. The descriptive statistics of the two groups after homogenization are presented below.

Testing of the First Research Hypothesis

Based on Table 4 below, there was a significant difference between the mean scores of the two groups, $U= 28.50$, $P<.05$. Therefore, the researcher safely rejects the null hypothesis. As the obtained sig. 000 is lower than the p .value the researcher can safely reject the first null hypothesis saying that using cognitive strategies does not have any statistically significant effect on Iranian EFL learners regarding their prompting reading comprehension ability.

Table 4

The Result of the Mann-Whitney U Test for the Comparison of the Reading Scores of the Control and the Experimental Groups

	Scores_Reading
Mann-Whitney U	28.500
Wilcoxon W	556.500
Z	-6.586
Asymp. Sig. (2-tailed)	.000

The result of the Shapiro-Wilk test of normality in table 5 shows that the data are not normally distributed for the control group ($P < .05$). Therefore, the appropriate test for mean comparison would be the Mann-Whitney U test. The descriptive statistics of the two groups are shown below.

Table 5

The Test of Normality for the Reading Gain Scores of the Two Groups

	Shapiro-Wilk		
	Statistic	Df	Sig.
Con_Gain_Reading	.786	32	.000
Exp_Gain_Reading	.959	32	.257

Testing of the Second Research Hypothesis

Based on Table 6 below, there was not any significant difference between the mean scores of males and females, $U = 116.50$, $P > .05$. Therefore, the researcher accepts the null hypothesis. As the obtained sig. 893 is higher than p.value (.05), the researcher can safely accept the second null hypothesis say that there is no statistically significant difference between Iranian male and female intermediate EFL learners regarding their promoting reading comprehension ability.

Table 6

The Result of the Mann-Whitney U Test for the Comparison of the Reading Scores of Males and Females

	Scores_Reading
Mann-Whitney U	116.500
Wilcoxon W	194.500
Z	-.152
Asymp. Sig. (2-tailed)	.880
Exact Sig. [2*(1-tailed Sig.)]	.893 ^b

The result of the Shapiro-Wilk test of normality shows that the data are not normally distributed for the two sets of scores ($P < .05$). Therefore, the appropriate test for mean comparison would be the Mann-Whitney U test. The descriptive statistics of the two groups are shown below.

Table 7*The Result of Normality Test for the Comparison of the Reading Scores of Males and Females*

	Gender	Shapiro-Wilk		
		Statistic	df	Sig.
Scores Reading	Male	.780	12	.006
	Female	.800	20	.001

Testing of the Third Research Hypothesis

Based on Table 8 below, there was a significant difference between the mean scores of the two groups regarding their vocabulary learning, $U = 119.50$, $P < .05$. Therefore, the researcher safely rejects the third null hypothesis. As the obtained sig .000 is lower than the p.value (.05), the researcher can safely reject the null hypothesis saying that using cognitive strategies does not have any statistically significant effect on Iranian EFL learners regarding their vocabulary learning.

Table 8*The Result of the Mann-Whitney U Test for the Comparison of the Vocabulary Scores of the Control and the Experimental Groups*

	Scores_Vocabulary
Mann-Whitney U	119.500
Wilcoxon W	647.500
Z	-5.302
Asymp. Sig. (2-tailed)	.000
a. Grouping Variable: Group_1_2	

The result of the Shapiro-Wilk test of normality in table 9 shows that the data are not normally distributed for the control group ($P < .05$). Therefore, the appropriate test for mean comparison would be the Mann-Whitney U test. The descriptive statistics of the two groups are shown below.

Table 9*The Test of Normality for the Vocabulary Gain Scores of the Two Groups*

	Shapiro-Wilk		
	Statistic	Df	Sig.
Con_Gain_Vocab	.818	32	.000
Exp_Gain_Vocab	.937	32	.062

Testing of the Fourth Research Hypothesis

Based on Table 10 below, there was not any significant difference between the mean scores of males and females regarding their vocabulary knowledge, $U = 113.50$, $P > .05$. Therefore, the researcher accepts the fourth null hypothesis. As the obtained sig. 803 is more than the p.value

(.05), the researcher can safely accept the four null hypotheses say that there is no statistically significant difference between Iranian male and female intermediate EFL learners regarding their vocabulary learning.

Table 10

The Result of the Mann-Whitney U Test for the Comparison of the Vocabulary Scores of Males and Females

	Scores_Vocabulary
Mann-Whitney U	113.500
Wilcoxon W	191.500
Z	-.259
Asymp. Sig. (2-tailed)	.796
Exact Sig. [2*(1-tailed Sig.)]	.803 ^b

The result of the Shapiro-Wilk test of normality in table 11 shows that the data are not normally distributed for the two sets of scores ($P < .05$). Therefore, the appropriate test for mean comparison would be the Mann-Whitney U test. The descriptive statistics of the two groups are shown below.

Table 11

The Result of Normality Test for the Comparison of the Vocabulary Scores of Males and Females

	Gender	Shapiro-Wilk		
		Statistic	df	Sig.
Scores_Vocabulary	Male	.851	12	.038
	Female	.786	20	.001

Discussion

The results of the parametric independent t-test, which were used to analyse the data of this study, indicated a statistically significant difference between the experimental groups and control groups on the dependent variable of reading comprehension and vocabulary achievement post-test. It indicated that the above-mentioned strategies are effective in improving EFL reading comprehension and vocabulary achievement of pre-university students at the intermediate level of English.

In more detail, the present study showed that in comparison to the performance of females and males in control groups, the performance of females and males in experimental groups were different. These differences were much significant compared to that of control groups. There was a significant difference between experimental groups (male and female) and control groups (male and female) in using summarizing, note-taking, and re-reading strategies. Moreover, the mean of experimental groups was higher than control groups based on post-test scores. In other words, the performance of experimental groups in using cognitive strategies (summarizing, note-taking and re-reading) showed better results than that of control groups.

In general, the prerequisite of parametric independent t-test, which was used to analyse the data of the present study, is that the obtained scores by test-takers of both groups must meet the condition of normality. The condition of normality is that the significance value must be higher than .05, otherwise; the condition of normality is violated and accordingly, we have to run a nonparametric test including the Wilcoxon test. It goes without saying that parametric tests are more valid than nonparametric ones. The significance value on the Shapiro-Wilk test of normality for participants' scores in reading comprehension and vocabulary at pre-test was 0.00, which is less than .05. The appropriate test for mean comparison would be the Mann-Whitney U test because the result of normality shows that the data are not normally distributed for the control group ($p < .05$). Based on the result of the Mann-Whitney U test for the comparison of the reading scores of the control and experimental groups, there was a significant difference between the mean scores of the two groups, $U = 28.50$, $P < .05$. Therefore, the researcher safely rejects the null hypothesis which indicated that cognitive strategies had no effect on promoting comprehension ability.

In the next phase, the result of the Mann-Whitney U test for the comparison of the reading scores of males and females showed that there was not any significant difference between the mean scores of males and females, $U = 116.50$, $P > .05$. therefore, the researcher accepts the null hypothesis which indicated that there is no difference between males and females in using cognitive strategies on reading comprehension.

In the third phase, the result of the Mann-Whitney U test for the comparison of the vocabulary scores of the control and experimental groups shows that there was a significant difference between the mean scores of the two groups regarding their vocabulary, $U = 119.50$, $P < .05$. therefore, the researcher safely rejects the null hypothesis which indicated that using cognitive strategies doesn't have any significant effect on vocabulary learning.

In the fourth phase, the result of the Mann-Whitney U test for the comparison of the vocabulary scores of males and females indicated that there was not any significant difference between the mean scores of males and females regarding their vocabulary knowledge, $U = 113.50$, $P > .05$. Therefore, the researcher accepts the null hypothesis indicated that there is no statistically significant difference between males and females in using cognitive strategies. Moreover, the control and experimental groups were homogeneous in terms of language proficiency, $t = 157$, $df (62)$, $sig. .876$, $P > .05$.

The results of the current study are discussed according to the above four main points: (1) Discussion of the Findings Related to Hypothesis One, (2) Discussion of the Findings Related to Hypothesis Two, (3) Discussion of the Findings Related to Hypothesis Three, (4) Discussion of the Findings Related to Hypothesis Four. At the end of each of the above sections, the results of other previous studies are always presented to compare and contrast with the results of the present study.

The result of the study was in accordance with Özdemir (2018), Rossiello et al. (2017), and Stasiuk (2021). therefore, no difference in learning between males and females. Along with Hung (2014), we concluded that the study bridged a gap between vocabulary and reading comprehension by the cognitive strategies. Anderson and Tenison (2016) employed a long process of the method for learning through cognitive strategies, while the present study was more complete and simpler.

Conclusion

As a result of the data analysis and the discussion of the findings, a number of conclusions can be drawn. With regarding the effects of cognitive strategies on learners' L2 reading comprehension and vocabulary improvement, and so as to fill the gap between these two components, it can be concluded that employing the cognitive strategy method led to the development of L2 reading comprehension and vocabulary knowledge. In addition, considering the difference between the effects of cognitive strategies of summarizing, note-taking, and re-reading as the three approaches on learners' L2 vocabulary knowledge and reading comprehension development, deductions can be made that, three variables of summarizing, re-reading, and note-taking would result in better vocabulary learning and reading comprehension ability. Therefore, summarizing, re-reading, and note-taking offer advantages in teaching and learning English reading comprehension and vocabularies, especially for high school EFL learners.

Consequently, we can conclude that the three variables of cognitive strategies help the students to understand the difficult text and words easily by looking at the text and fade the employing of the traditional approach. Moreover, using some techniques such as visualization and verbalization in teaching vocabulary were employed by the researcher as an experienced teacher to hit the spotlight on the teaching and learning process. The use of strategy and technique as two accompaniments make the reading and vocabulary learning more enjoyable and interesting because they can remember the meaning of the difficult words by association and without asking another person or looking them up in the dictionary. In addition, we found that strategies can make the class more active and alive and can attract the students' curiosity in learning new reading text and vocabulary.

Comparing the male and female participants' performance on reading comprehension and vocabulary tests after cognitive strategies treatments led the researchers of the current study to conclude that there was not any significant difference between male and female Iranian high school EFL learners' reading comprehension and vocabulary learning through cognitive strategies. Thus, we testify that no differences exist between males and females in terms of their vocabulary, but this finding does not mean that differences do not exist in other aspects, such as written and spoken use of language as reported by previous studies e.g., (Özdemir, 2018; Rossiello et al., 2017; Stasiuk, 2021). Therefore, conclusions with respect to the effect of gender should be treated with care and it will be necessary to pay attention to this point.

Drawing on findings and discussions of this study, there are several pedagogical implications of teaching vocabulary and reading comprehension by using cognitive strategies examined in this study. First, what was observed in this study was the employing of a type of strategy (summarizing, note-taking, re-reading) with high school learners that were different from the conventional practicing type. Consequently, teaching administrators and teachers trainers are recommended to explore the possibility of familiarizing and equipping English teachers and practitioners with the cognitive strategy for teaching new materials, particularly, vocabulary items and reading comprehension. Second, there are implications for the design and development of tasks, and their implementation in the class context. One direction for teachers and practitioners would be to investigate ways in which the design and implementation of vocabulary learning tasks and reading comprehension can push learners to more effective and permanent vocabulary and reading gains.

As proved by the findings of the current study employing cognitive strategies can help classroom learners to reach a more impressive number of vocabularies, and grasp reading comprehension on condition that one possibility would be to introduce such strategies through predesigned tasks by the teacher or material developers. Third, teachers should choose the technique and materials that are appropriate to the students' needs and experiences so as the class atmosphere becomes enjoyable and interesting as recommended by many experts e.g., (Anderson, 2016; Rossiello et al., 2017). This objective could be achieved by using cognitive strategies which were operationalized as implementing pictures and movies in the current study.

There is an obvious need to promote reading skills and vocabulary components in educational centres in Iran and help students to achieve a high level of education. One of these issues is that most teachers still employ traditional methods in teaching. While some other teachers who are familiar with new development in educational psychology, try to employ effective cognitive strategy variables to help students in reading and vocabulary. Another issue is that teachers are not aware of the differences between male and female learners' cognitive abilities that play an indispensable role in their reading comprehension and vocabulary development. Nowadays, all over the world, more or less in Iran adopting, new strategies in teaching are remarkable. It is a need for a research study to make teachers become aware of the advantages of these issues and evoke their interests.

Recommendation for Further Study

In addition to what the present study has concluded, researchers have the opportunity to explore many techniques in which cognitive strategies can enhance language learning. More studies should be conducted in the future to investigate the role of cognitive strategies on teaching reading and vocabulary as well as on teaching and learning EFL activities and skills.

- 1) There are other important variables like subject's proficiency level, major, motivation, psychological type, sensory preference, attitude and so on which have not yet been investigated among Iranian EFL learners which can serve as interesting areas for future research in relation to cognitive strategies.

- 2) In this study, only pre-university students participated who were young adults. This can be replicated by allowing children and adults (learning English at private English institutes and universities) and guidance / high school-level students, to take part and check what the findings will be.

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