

## The Effect of Mental Imagery Strategy Instruction on Reading Comprehension of EFL Students

### Article info

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### Abstract

The aim of this research was to investigate the effectiveness of mental imagery on the English language comprehension of sixth grade students. The method is semi-experimental and its plan involves pretest, post-test, and follow-up. Using a multi-stage random sampling method, 32 students were selected from schools in the district (2) and assigned to either the experimental or evidence group - each group consisted of 16 students. All the students within both groups were given a pretest which consisted of 20 multiple choice questions (with 4 possible answers each). There was no significant difference between the mean scores gained by the students of both groups on the pretest. The experimental group received the mental imagery teaching program and how to form pictures in the mind-e.g, how to visualize-before reading, while reading, and after reading a short story, for example, by being requested to draw pictures of the characters, scenes, or setting in the story as they perceived them. The evidence group received no instruction. To measure the effectiveness of the treatment program for each experimental condition, a research-made reading comprehension test was applied. There were significant differences between the experimental and evidence groups, when data analysis was performed by ANOVA, using repeated measures. The findings showed that the mental imagery teaching program can improve the English language comprehension and this study suggests that the English teacher may improve her teaching strategy by optimizing the use of a variation technique in school. The teacher should be creative while delivering materials in the class.

**Keywords:** Mental imagery, English language comprehension, Reading research, Learning and instruction, Short Story

## Introduction

Reading has been defined as interpreting and/or meaningfully treating discourse signs. This perception of reading highlights the integrated relationship between the reading action, on the one hand, and reading comprehension in the readers' minds, over which one has to gain mastery to create a meaningful relationship with the text (Van Den Brock et al., 2005). The ability of students to read is greatly influenced by their attitudes regarding the purposes for reading. If students want to get the most out of the materials they are assigned, they have to learn to read critically or analytically. The idea here is that when we read something, the purpose is to try to understand the author's intention through mental imagery. When dealing with reading, we encounter layers of reality: One that we can see and one that we cannot see. Therefore, the purpose of reading is to make the invisible layer, the underlying meaning, visible and clear. According to Block & Israel's statement in 2005, research has shown that good readers are actively involved with the text, and they are aware of the process they use to understand what they read. Teachers can help improve students' comprehension through mental imagery strategies. Predicting, making connections, inferring, questioning, summarizing and creating mental imagery are the strategies which have been shown by research to improve reading comprehension (Küçüköğlü, 2013). Duke & Pearson (2009) asserted that it is important to teach the strategies by naming the strategy and how it should be used, modeling through the think aloud process, group practice, partner practice, and independent use of the strategy (Küçüköğlü, 2013). The results of several studies have indicated that comprehending textual concepts depends on the individual's experiences of the peripheral world (Anderson and Pierson, 1984). Among such skills, mental imagery plays a mediatory role in organizing and encoding the information in the memory (Sadoski et al., 1991). In order to be a good reader, learners should set a goal for their reading. Therefore, good readers have a purpose for reading. This strategy also allows more students interaction, which increases student interest and improves their understanding of the text (Oczkus, 2003). Some of the approaches for teaching predicting are teacher modeling, predicting throughout the text; with partners, with a graphic organizer, or using post-it notes throughout the text. Using the title, table of contents, pictures, and key words is one prediction strategy. By making connection, the learners can activate their prior knowledge and connect the ideas in the text to their own experiences. Reading becomes meaningful when the reader connects the ideas in the text to their experiences and beliefs, and the things happening in the outer world. Giving a purpose to student's reading, by asking them to find connections, would help them comprehend the ideas better in the text. Serafini (2004) stated that inferring refers to reading between the lines. Students need to use their own knowledge along with information from the text to make their own conclusion. Through inferring, students will be able to draw their own conclusion, make predictions, identify underlying themes, use information to create meaning from text, as well as use pictures to create meaning (Goudvis & Harvey, 2000). Students can be given techniques to use illustrations, graphs, dates, related vocabulary and titles from the text to make inferences (Küçüköğlü, 2013). Readers can use the questioning method before, during, and after reading. The questioning process requires readers to ask questions in order to construct meaning, enhance understanding, find answers, solve problems, find information, and discover new information (Harvey & Goudvis, 2000). In this strategy, the students return to the text throughout the reading process to find answers to questions asked by the teacher before, during and after the reading. By this strategy, students practice how to distinguish between questions that are factual, inferred, or based on the prior knowledge of readers (NRP, 2000). It is stated that summarizing is a strategy which helps students to organize ideas, even in the long reading passages which are usually perceived as threat by students (Küçüköğlü, 2013). Mental imagery (visualization) requires the reader to construct an image of what is read. This image is stored in the reader's memory as a representation of the reader's interpretation of the text (National Reading Panel, 2000). Teachers can motivate students to visualize the setting, characters, and actions in a story and ask them to make drawings or write about the image that come to their minds after visualizing the text (Küçüköğlü, 2013). Mental imagery has been defined as the ability to make mental images, as well as the action and/or process of creating conceptual images in a visual manner. The ability to visualize an image and/or a scene accompanied with words and expressions, help the reader to meaningfully handle, organize and bind the thoughts in mind. This is done based on encoding the visual

information according to an internal image, which can be reactivated by recalling the image. The visual information are filtered, and then summarized. Finally they are stored as abstract predicates in the form of mental images. Thereafter, memory reactivation takes place with respect to recalling the abstract code, and then its relevant mental imagery (Nelson, 2005). This ability, as a powerful tool, makes a connection between the encoded discourse and visual information, and stores the data in integration with the individual's prior knowledge in their long-term memory (Reynolds and Miller, 2003). In particular, a number of researches have proposed that visual imagery techniques can be effective on inferential learning strategies that can improve working memory efficiency by reducing the cognitive load associated with the mental modeling process (Joffe et al., 2007). Yuill and Oakhill (1991) contended that inferential strategy instruction should improve working-memory efficiency because linked story information can be processed more economically. However, some researchers are of the opinion that some instructional procedures can be counterproductive because they can incorporate unnecessary cognitive activity that places heavy demands on working memory (McKeown et al., 2009). The concern is that some strategic processes will cause learners to engage in extraneous cognitive processing that does not support learning (Stull & Mayer, 2007). For example, when word recognition is not automatic, letter-by-letter decoding will be attention demanding and interfere with reading comprehension. In situations like this, an executive process will be involved in more active or conscious chunking, as opposed to the automatic chunking of information (Allen et al., 2006). Afflerbach et al. (2008) stated that initially, the utilization of any reading strategy may involve resource demanding conscious attention (Woolley, 2010, p.111). Presently, there are several imagery methods such as mental imagery from still images, making mental images of parts of the text, mental imagery through sharing views, and trans-mental imagery of the perceptions acquired during the teaching of reading skill (Nelson, 2005), and all of them are not only highly effective on the readers' motivation (Harvey and Goudvis, 2000), but they are also a great influence on the revision of prior knowledge (Keene and Zimmerman, 1997), increasing the individuals' vocabulary capacity (Zwiers, 2004), and better comprehension of words and text (Gambrell and Bales, 1986). The effectiveness of the mental imagery method on the enhancement of students' reading comprehension ability has been confirmed in language learning programs outlined in numerous studies. For example, the findings of studies performed by Ghazanfari (2011); Erfani et al. (2011); Niknejad and Rahbar (2015); Zafarpur and Tabataba'ee (2015), Gha'edi and Shahrokhi (2016); Nelson (2005); Joffe and Cain (2007); Rader (2009) and also Dyah Anggraeni (2014) indicated that mental imagery is effective on the enhancement of adult learners' reading motivation, reading ability improvement, vocabulary size, and reading comprehension. As a result of the fact that the majority of studies undertaken have dealt with the effects of mental imagery on adult learners, the present study has attempted to find an answer to this essential question: "How does still-image mental imagery influence the reading comprehension of sixth-grade students?"

## Methodology

This study is a semi-experimental investigation performed based on pretest, post-test, and follow-up methods. The under studied population includes all sixth grade students of Tehran who were educated in the 2015-16 academic year. The study sample was selected using multistep randomized sampling methods from primary schools in the Educational District 2 of Tehran, and 32 students were selected completely stochastically and were equally assigned to two experimental and evidence groups (each group includes 16 students). Before experimentation, the testees underwent pretests via identical reading comprehension tests (storytelling plus 20 multiple choice items) and the ability and reading comprehension of students in each group were assessed in this way. For every correct answer, the testee received a positive point, and the maximum possible score was 20. Thereafter, the experimental group with mental imagery received the necessary training in six sessions 45-minute, thrice a week. The experimental group was subjected to training by means of mental imagery based on voiceless methods. This was done in such a manner that at the onset of the training program, the testees were asked to freely create mental images before, during, and after reading the summary of a short story (see Table 1), and draw their mental images of the characters, scenes and locations in the story, according to what they perceive. Finally, they were asked to answer

reading comprehension questions. These stages were accomplished in 6 training sessions in an identical format. The expectation is that when they read independently, they should focus on meaning (McKeown et al., 2009) and automatically visualize story content throughout the reading process.

Table 1. A flexible multiple- strategy framework incorporating some mental imagery strategies.

| Phrases        | Processes                                                                                                              |                                                                                                                                                                         |
|----------------|------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | Creating Mental Imagery/Local Scenes/Events                                                                            | Creating Mental Imagery/global Episodes/Story                                                                                                                           |
| Before reading | Creating mental imagery of similar scenes from similar background experiences, to draw the opening scene of the story. | Using a graphic organizer to understand the structure of the text to be read. Asking questions to help elaborate drawn pictures.                                        |
| During reading | Stopping at an appropriate place in the narrative and drawing a picture related to story events as the plot unfolds.   | Asking and answering questions related to character actions and scenes, as it relates to the drawings.                                                                  |
| After reading  | Making a summary drawing of the resolution scene.                                                                      | Using the graphic organizer as a way to organize a summary, by placing each of the three drawings in the appropriate space on the organizer and making an oral summary. |

The evidence group received the common necessary trainings in six 45-minute sessions, three times a week. In this method, first, the story was read aloud and in a group by the researcher. Thereafter, the students were asked questions regarding the story's subject, and they were asked to observe the reading comprehension and multiple choice questions without reading the story and then complete the comprehension test. This procedure was identically exerted in all the training sessions. Finally, after two weeks, post-test 1 was undertaken. Post-test 2 was implemented to investigate the experimentation effect of the stability rate. To evaluate the experimentation in the present study, researcher-made story summaries were used along with the reading comprehension drills pertaining to the same stories. The stories were appropriately selected from the series of Penguin Readers' collection, according to the introductory level of the sixth-grade students' English knowledge. Penguin Readers' book (Kalinz, 2003) is a classified collection of books written based on the storytelling style, words, methods and contents corresponding to the readers' English language levels. Pretest, post-test and follow-up tests were prepared as three parallel forms, each consisting of 357 words constituting 20 items multiple choice. The tests validity was investigated according to the extant components of the tests, their fitness with the sixth-grade students' lingual knowledge and skill levels by the English teaching specialists and it was confirmed after undergoing several processing activities both in terms of face and content validity. To calculate the English language tests reliability of the questions in the experimental and evidence groups during the pretest, post-test and follow-up, Cronbach's alpha coefficient was calculated for all the questions of the test. The acquired coefficients for pretest, post-test and follow-up questions were 0.779, 0.708 and 0.739, respectively. All of them are indicative of a very good internal consistency of the questions.

## Results and Discussion

The mean and the standard deviation of the test scores of English learning students in experimental and evidence groups in terms of pretest, post-test and follow-up results are presented in Table (2).

Table 2. The mean and the standard deviation of the testees' reading comprehension scores for experimental and evidence groups in pretest, post-test and follow-up test.

| Group              | Number | Pretest |                | Post-test |                | Follow-up |                |
|--------------------|--------|---------|----------------|-----------|----------------|-----------|----------------|
|                    |        | Mean    | Std. Deviation | Mean      | Std. Deviation | Mean      | Std. Deviation |
| Experimental group | 16     | 16.31   | 2.54           | 18.06     | 1.80           | 18.80     | 1.26           |
| Evidence group     | 16     | 16.25   | 3.90           | 16.94     | 3.11           | 17.00     | 2.68           |

According to Table (2), in the experimental group as well as in the evidence group, English language reading comprehension test scores mean increased in pretest stage and follow-up in respect to the pretest stage. However, this increase was a little higher in the experimental group than the evidence group. No much difference existed between the two groups' means concerning the pretest stage. Figure (1) indicates these results.

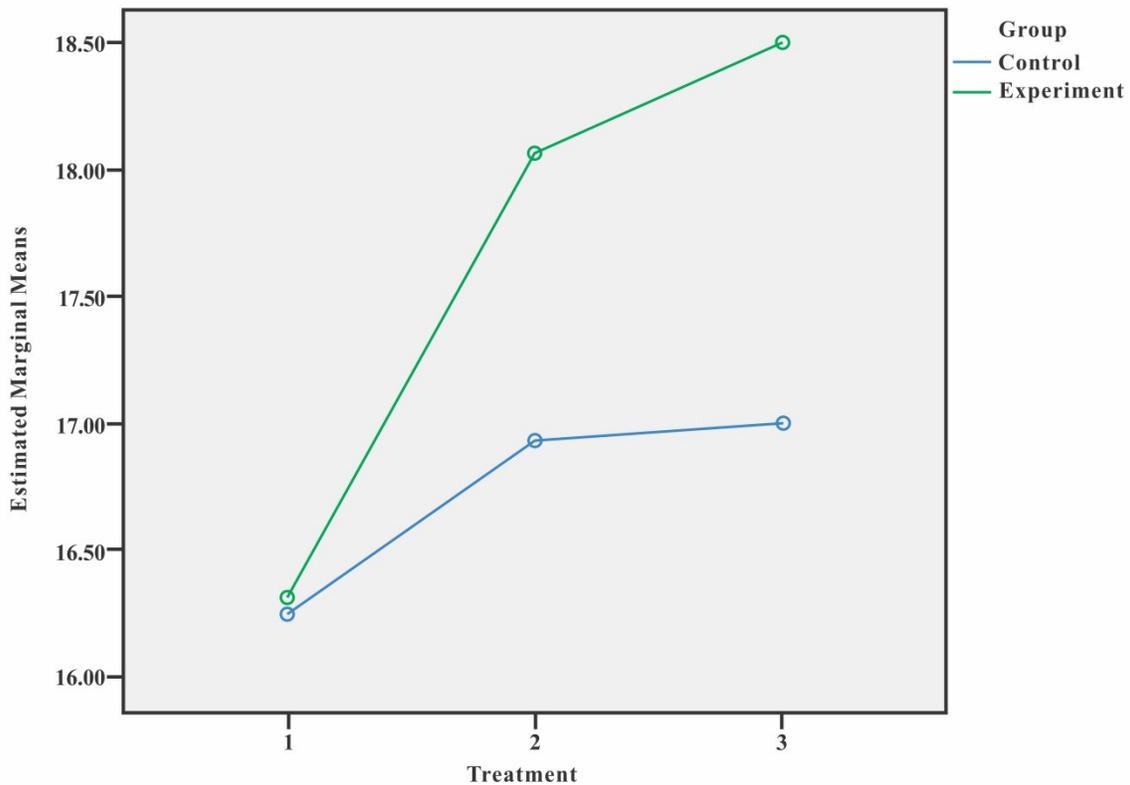


Figure (1): The mean and the standard deviation of the experimental and evidence groups, comprehension scores in pretest, post-test and follow-up stages.

The result of Table(3) is indicative of the integrated variance analysis within groups and Between groups factors.

Table 3. The summary results of the integrated variance analysis within groups and between groups factors

| Factors               | Source of variation  | Sum of squares | Degree of freedom | Mean squares | F      | Significance level | Effect size |
|-----------------------|----------------------|----------------|-------------------|--------------|--------|--------------------|-------------|
| Within groups factor  | Instructional stages | 39.521         | 1.523             | 25.942       | 17.204 | 0.001              | 364.0       |
|                       | Interaction stages   | 8.896          | 1.523             | 5.839        | 3.872  | 0.038              | 0.114       |
|                       | *Error group         | 68.917         | 45.702            | 1.508        |        |                    |             |
| Between groups factor | Stages Error         | 19.260         | 1                 | 19.260       | 0.990  | 0.328              | 0.032       |
|                       | Error                | 583.396        | 30                | 19.447       |        |                    |             |

The result in Table (3) indicate that regarding the within group factor of the instructional stages, the F-value calculated for the stages (pretest, post-test and follow-up) disregarding the grouping process was statistically significant at 5% level ( $P < 0.05$ ,  $F = 17.2$ ), implying that a significant difference existed between

the comprehension test scores in the three instructional stages. Also, according to the results presented in Table(3) regarding the interaction between the stages factors and the groups, the F-value calculated for the impact of the stages (pretest, post-test and follow-up) was statistically significant at 5% level ( $P < 0.05$ ,  $F = 3.872$ ) between the two experimental and evidence groups. Therefore, a significant difference was observed in the two experimental and evidence groups between the pretest, post-test and follow-up mean scores, regarding the English language tests. According to the results presented in Table (3) for main between group impact factor, the F-value calculated was not statistically significant at the 5% level ( $P > 0.05$ ,  $F = 0.990$ ). Therefore, there no significant difference existed between English language test total mean in the two experimental and evidence groups. Generally, it can be concluded that teaching mental imagery to the children in the experimental and evidence groups brought about a significant difference in English reading comprehension test scores in the pretest and follow-up stages in respect to the pretest stage. This is a way that the reading comprehension test scores increased in the pretest and follow-up stages, but the increase rate was higher in the experimental group than the evidence group. Also, the follow-up scores in the experimental group experienced an increase, whereas in the evidence group, the follow-up stage scores did not have a great increase. The effect size calculated for the instructional stages effect was 0.364 which is indicative of the fact that approximately 0.36 of the within group variations can be accounted for by the teaching effects. Therefore, it can be concluded that both teaching methods were found effective in increasing the post-test scores but the mental imagery methods provided a greater increase which could also be traced to the follow-up stage. To evaluate significant difference between the English language mean scores, the variance analysis with repeated measures was used for both students in the experimental group (the group with mental imagery training) and students in the evidence group (the group without such a training program) in pretest, post-test and follow-up stages separately. The three pretest, post-test and follow-up stages were considered as the within-testee factors. Variance analysis results are summarized in Table (4) separately for both groups.

Table 4. Summary results of the variance analysis with repeated measures for Experimental and Evidence groups.

| Group              | Sources of variation | Sum of squares | Degree of freedom | Mean squares | F      | Significance level | Effect size |
|--------------------|----------------------|----------------|-------------------|--------------|--------|--------------------|-------------|
| Experimental group | Instructional stages | 42.875         | 1.440             | 29.771       | 16.162 | 0.001              | 0.519       |
|                    | Error                | 39.792         | 21.602            | 1.842        |        |                    |             |
| Evidence group     | Instructional stages | 5.542          | 1.627             | 3.406        | 2.854  | 0.086              | 0.160       |
|                    | Error                | 29.125         | 24.402            | 1.194        |        |                    |             |

From the results of Table (4), the instructional stages (pretest, post-test, follow-up) within group factor effect was significant at the 5% level ( $P < 0.05$ ,  $F = 16.162$ ) only with respect to the experimental group. This implies that a significant difference existed between the English language test scores in three instructional stages. Therefore, it can be concluded that mental imagery teaching in the experimental group students (with mental imagery training program) caused a significant increase in English language scores in post-test and follow-up stages in comparison to the pretest stage. This is in a manner that English language scores experienced an increase in post-test and follow-up stages in contrast to the pretest. The calculated effect size was 0.519 for instructional stages effect which is indicative of the idea that 0.52 of the English language scores within group variations in the experimental group can be explained by the mental imagery training effect. Therefore, it can be concluded that mental imagery method has been highly effective in increasing the English language reading comprehension scores in the experimental group. The test results of variance analysis with repeated measures performed for the purpose of investigating the effectiveness of mental imagery method on English language learning lesson reading comprehension is a reflection of the fact that the intervention program caused an improvement in the experimental group testees performance, regarding the comprehension test. The findings of the present study confirm the results obtained in other

studies (Ghazanfari, 2011; Niknejad and Rahbar, 2015; Nelson, 2005; Anggraeni, 2014; Joffe et al., 2007; Rader, 2009; Yukselir, 2014). In elaborating on the obtained results it can be stated that mental imagery has proved to be a potential facilitating factor in retrieving items from memory as well as comprehending and interpreting sentences (Paivio, 1979). Mental imagery and depicting story images in mind are one of the strategies with a positive relationship with students' reading progress (Padron and Waxman, 1988). Students with higher capability of mental imagery indicated better performance in reading and memorizing the texts (Tomlinson, 1997). Therefore, when the students managed to produce a larger quantity of mental images, the texts recalling rate was also increased. The students could establish a connection between the new information and their prior experiences (Wittrock, 1983). In fact, mental image production by the students was taken into consideration when they got engaged in reading a literary text (Block, 1986). The mental imagery method is associated with students ability and interests, and has been found to have increased students motivation for reading comprehension and story reading. Also, the topics of stories were attractive to the students. Thus, mental imagery has been effective on increasing the students' reading comprehension capability and reading potency as a robust tool (Wooley, 2011). This method allows the students to exercise and repeat guessing the meaning of the words in the context. The selective variability of the topics was effective on the text reading. Students were found motivated as well as interested in reading, also they were active and eager during the course of teaching and learning process. They were encouraged to draw paintings of characters, objects and scenes from stories. This corroborated with their complicated mental model structures (Mc Laughlin, 2003). Although there is an important point in the findings obtained through the study, the results are relevant to the intervention program effect size. Variance analysis with repeated measures is indicative of a significant difference in English language scores in post-test and follow-up stages as compared with pretest stage, in such a manner that English language scores in post-test and follow-up stages experienced an increased in contrast to the pretest stage. The calculated effect size gave a value of 0.519 for instructional stages effect and this value suggests that 0.52 of the English language within group variations can be accounted for by the mental imagery training.

### **Conclusion**

It can be concluded that mental imagery training method has been effective in increasing the experimental group reading comprehension scores. Among the limitations of the present study include the limited period of time (three weeks) in which the study was conducted, and the study being limited to 12-year-old students. The statistical sample included 32 students who were assigned into two experimental and evidence groups and caused a limitation of samples in non-governmental schools due to the limited number of students. According to the findings, the use of mental imagery positively affected comprehension. Therefore, it is suggested that the ESL teachers like the other language teachers, should take advantage of mental imagery method, in order to enhance the reading comprehension competency. Also, it is suggested that such types of studies should be performed on various educational grades and levels in order to compare and analyze the different results to figure out the role and the effect of new teaching methodologies appropriately. Moreover, the result of this research can be used in state schools and institutes, in order to help the teaching and learning system, also teaching training courses (TTC) should be held for teachers to become familiar with mental imagery strategy instruction.

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