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# The Effect of Educational Software (DENIS) and Games on Vocabulary Learning Strategies and Achievement *

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**Abstract**

This study was carried out to measure the impact of the use of educational software (An individual educational software and games) used in vocabulary teaching on the success and the strategy use of the students. To measure the impact of educational software and games on the success of students, a quasi-experimental method consisting of one group repeated measurements was applied. A quasi-experimental method consisting of a one group pre-test and post-test was used to test the second question of the study which was the impact of the educational software and games on the students' use of vocabulary learning strategies . Two types of educational software were used in the study. One of them (Dynamic English Vocabulary Instruction Software) was a type of educational software used individually and the other consisted of four different computer games. The implementation process of the research consisted of a total of 9 weeks. Vocabulary was taught to the same group of students with the help of two different types of educational software (DENIS and Games setting) consecutively, and the success of the students in pre, mid and post-tests were compared. After the analysis, it was concluded that both types of software had positive effects on vocabulary learning. A foreign language vocabulary learning strategies scale (Kocaman & Kızılkaya Cumaoğlu, 2014) was applied at the beginning and end of the application process. When pre and post-test scores of the scale were compared to subscale and total scores, it was concluded that the use of compensation strategies by the students increased significantly. In the study, vocabulary learning strategies were also analysed to figure out whether they changed according to gender. When strategy use was analysed according to gender, it was found that compensation strategies were more used by male students than female students.

**Keywords**

Educational software
Vocabulary learning strategies
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## Introduction

Vocabulary development is a very important foundation for students who are learning a language because a word is a tool that conveys its meaning to our minds (Dewey, 1910). Shejbalová (2006) mentions that vocabulary learning is one of the most significant components of learning a new language. Thus, various instructional designs should be referred to, to actualise vocabulary acquisition and sustain the learners' effort and motivation (Nation, 2001). Wachob (2006) emphasized the importance of the sense of autonomy and Dickinson (1987; 1995) associated autonomy with motivation and success in language learning and supported the view that autonomy reduces the obstacles by providing learners with self-confidence (as cited in Murray). Qingzhao (2011) stated that no matter how perfect their teacher is, learners without autonomous learning and having no additional assistance apart from their teacher, cannot be successful in learning a language. As understood from the related literature, learner autonomy plays an important role in learning a language. One of the most influential ways of providing learner autonomy is Computer Assisted Language Learning and Teaching applications (CALLT). These applications bear a serious potential to enable teachers to turn their perceptions of teacher centeredness into student centeredness. While some studies conducted in Computer Assisted Language Learning (Tozcu & Coady, 2004; Eşit, 2007; Nakata, 2008; Kılıçkaya & Krajka, 2010; Lin et al., 2011; Kayaoğlu et al., 2011; Gorjian et al., 2011; Fehr et al., 2012) only examined instructional software where a teacher is not present, some others (Koçak, 1997; Özdemir, 2001; Tokaç, 2005; Cellat, 2008) based their studies on comparing teacher-led instruction with computer-assisted instruction(as cited in Başöz & Çubukçu, 2013).

Zhao (2005) who studied the effect of technology on language learning reported that technology is used in various ways to create fruitful language learning settings, the most important four dimensions of which are increasing language input and output, providing exercise and feedback, providing and sustaining motivation and authentic communication. The use of computers in language acquisition provides learners with educational software tools containing all varieties of practice for lexical knowledge, grammar subjects and pronunciation (Seljan, Berger & Dovedan, 2004). It can be said that computer assisted vocabulary learning is one of the most widely used applications of computer assisted language learning.

Naraghizadeh and Barima (2013) expressed in their experimental study on language learners that computer-assisted language learning had a strong influence in the development of vocabulary skills. In a similar study, Tamjid and Moghadam (2012) concluded that computer-assisted vocabulary learning extrapolates in a shorter period compared to traditional vocabulary learning. In addition, Oxford and Scarcella (1994) expressed that students generally prefer learning vocabulary on their own rather than being instructed by someone. (p. 231).

Given these findings in the literature, it seems that vocabulary learning software which students can use on their own will provide students with autonomy and support them in learning vocabulary faster and more effectively. Taking these necessary features for educational software into account, it should be borne in mind that computer games have high educational value (Dyck, Pinella, Brown & Gutwin, 2003; Sandford, Ulicsak, Face & Rudd, 2006; Rovertso & Howells, 2008; Vagel, Bowers, Muse & Wright, 2006). At this stage, it should also be taken into consideration what features educational software should have. In this regard, taking into account the implicit and explicit vocabulary learning, Ma and Kelly (2006) argued that, useful strategies should be taught for the design of computer-assisted vocabulary learning software. It seems that if software is to be used specifically in vocabulary learning, it should be developed in accordance with the learning strategies, and it will inevitably contribute to success. As a matter of fact, Hong-Nam, Leavell (2006) stated that those who use more language learning strategies have a faster and more continuous development than those who use less.

Researchers in the field of language teaching accentuate that software provide autonomy for learners on one hand and support strategy use on the other, should be developed, and this raises the question of what type of software has more impact on learning or maybe on strategy use. Arising from this question, the current study was carried out to measure the impact of the use of educational software in vocabulary learning and to measure the effects of computer assisted vocabulary learning on the use of strategies

***Research questions***

1) Do educational software (DENIS) and computer games have any significant impact on grade 6grade 6 students' success in vocabulary learning?
   a. Does the educational software (DENIS) have any significant impact on grade 6 students' success in vocabulary learning?
   b. Do computer games have any significant impact on grade 6 students' success in vocabulary learning?
   c. Do educational software (DENIS) and computer games have any significant impact on grade 6 students' success in vocabulary learning?
2) Do educational software (DENIS), computer games and gender have any significant impact on grade 6 students' strategy use?

## Method

***Design***

While a semi-experimental method consisting of one group repeated measurements was applied to test the first research question, to test the second question of the study a semi-experimental method consisting of a single-group pre-test-post-test was used.

***Study Group***

The Study group consisted of 68 grade 6 students studying at a public school in the province of Sakarya. The purpose of choosing the 6th graders as the study group comprised the students who had not used the book "Spring 7" which was published by Ministry of National Education (MONE) because the words used in the software and games were taken from this book. The other reason for choosing the study group was that 6th graders feel more carefree and mentally comfortable than the 7th and 8th graders who are to take an important test such as high school entrance exams. Based on their past experiences, researchers are aware of the fact that the students who are to sit such nationwide tests like High School Entrance Exam (LGS) usually have problems in focusing especially on English classes.

The Study group consisted of 40 (59%) female and 28 (41%) male students. Researchers also collected the information on how many of the students had computers and internet access at home and for what purposes they used them. Table 1 shows this information.

**Table 1.** Some Demographic Characteristics of the Study Group

| **Gender** | **Female** | **% 59 (n= 40)** |
|---|---|---|
| | **Male** | **% 41 (n= 28)** |
| Having computer | | % 66.2 (n=45) |
| Having Internet access | | % 54.4 (n=37 |
| **Purpose of using the computer and the Internet** | | |
| Doing homework | | % 91.2 (n=62) |
| Watching films | | % 50.0 (n=34) |
| Playing games | | % 77.9 (n=53) |
| Listening to music | | % 10.3 (n=7) |
| Chatting with friends | | % 41.2 (n=28) |

*Implementation Process*

The Implementation process of the research consisted of a total of 9 weeks. In the first week, students were informed about the software to be used in the laboratory and the 8-week process, and then the pre-tests of vocabulary learning strategies scales and an achievement test were administered. The educational software (DENIS) was implemented two hours a week for the next three weeks. In the fifth week, an achievement test was administered again. In the 6th, 7th and 8th week, the students played the computer-assisted games for 2 hours per week. In the 9th week, the post-tests of the achievement test and the vocabulary learning strategies scale were applied. A summary of the implementation process is displayed in Table 2.

**Table 2.** The Implementation Process

| **Measurement (Week 1)** | **Implementation (Weeks 2, 3 and 4)** | **Measurement (Week 5)** | **Implementation (Weeks 6, 7 and 8)** | **Measurement (Week 9)** |
|---|---|---|---|---|
| Achievement test (pre-test) VLS-Scale pre-test | Educational Software (DENIS) | Achievement test (Mid-test) | Educational games | Achievement test (post-test) VLS-Scale post-test |

*Data Collection Instruments*

In this study, an achievement test and a foreign language vocabulary learning strategy scale were used. In addition to this, an information form was used to get the demographic information on students' computer and internet access possession and their intended use.

*Vocabulary learning Strategies in a Foreign Language (VLS-S)*

This scale was developed by the researchers (Kocaman & Kızılkaya Cumaoğlu, 2014).The purpose of the scale is to determine the vocabulary learning strategies the students while learning vocabulary. The Cronbach's alpha reliability coefficient was calculated as .92 in the pre-scale and .90 in the post-scale. This scale was used twice as pre-test and post-test throughout the study. The scale includes six sub-dimensions; Memory, Cognitive, Metacognitive, Affective, Social and Compensation strategies.

*Achievement Tests*

To measure the success of the students in this study, a 50-item paper based exam was prepared. The same test was used as Pre-and post-test. A multiple choice test was prepared in which the students were given the visuals of the words and asked to choose the matching word from four options. In order to prepare the content of the achievement test, the course book followed at the 7th grade was analyzed in detail and abstract vocabulary was eliminated due to difficulty of illustration. Thirty words in an equal proportion of lexical types (noun, verb, adjective) were selected from each chapter of the first eight units from the 16-chapter course book "Spring 7" These words constituted the contents of the educational software (120 words) and game applications (120 words). Thus, a vocabulary pool of 240 words was created. A paper based vocabulary test comprising 50 picture-based multiple choice questions was prepared from 240 words to give to the students at the beginning and end of the study to measure overall change. The first 25 words in the test were the words taught by the educational software DENIS and the last 25 of the words were the words taught by the games. The achievement test consisted of 50 words. Students' scores from the first twenty-five words were used to analyse the impact of the educational software DENIS as the first question of the study, and their scores from second twenty-five words were used to analyse the impact of the games. One point was given for each correct answer in the tests.

An item analysis of the test was done through a package program called "Iteman" The test consisted of 50 multiple choice questions and p and r values were calculated to see the item discrimination and difficulty. Correlation Coefficient (r) values were obtained as over .40 and item difficulty (p) values ranged from 0.21 to 0.90. Internal consistency reliability (KR-20) value was computed as .83. For the validity of the achievement test, two English teachers and an expert in the field of language teaching were consulted. In line with the expert advice, necessary arrangements for content and appearance validity were made.

***Instructional Materials***

Two types of educational software were used in the study. One of them (Dynamic English Vocabulary Instruction Software) was a type of educational software used individually and the other consisted of four different computer games. All educational materials used by the researchers were developed based on the opinions of experts.

***a) Educational Software- DENIS (Dynamic English Vocabulary Instruction Software)***

This software was designed by using DELPHI: Embarcadero ® RAD Studio XE programming languages. This programme aims to provide students with an opportunity to practice vocabulary by delivering three forms of them (audial, visual and textual). The program progresses step by step. In the first step, by allowing the users to choose the level of language or area of interest, the user selects the vocabulary pool to practice. Then visual and written forms of the words are randomly displayed on the screen and the audio of the word is played synchronously. After every single word is displayed and played by the computer one by one, the very same words appear on the screen again randomly but this time the user can only see the visual and listen to the audio of the word. At this stage, the user tries to remember the spelling and pronunciation of the word. Repetition of different forms of the words is assumed to consolidate user's vocabulary. Users can turn on or off the audio of the words at will. When the software is used under the supervision of a teacher, with the instructions given, vocabulary can be taught in accordance with certain strategies. The program can also be used for self-study. Students, by developing their own learning strategies, can use the program with different combinations of the words- with or without audio and with or without text. The program's dynamism stems from the fact that it can be used for different languages with different data. The program can be used for different languages by loading the desired audial, visual or textual forms of the words in that language.

This software can also be used to measure reaction time in bilingualism studies.

***b) Computer games***

Four different educational games were presented to the students for the purpose of teaching vocabulary: Hangman, card matching, puzzle, and matching games.

*Hangman:* One of the commonly known games, hangman was developed with the help of Adobe Flash software. The students were asked to know the word the image and sound of what was projected on the screen. Due to the rules of the game in the case of a wrong answer, one line was drawn. After 8 wrong answers, the picture of the hanged man was completed. After a wrong answer, the correct answer with the sound of the word was provided on the screen at the same time.

*Card matching:* The game developed in Adobe Flash program is one of the frequently used memory games. In this game students were asked to match photos labelled pictures with voiced ones.

*Puzzle:* This game was developed by The Hot Potatoes 6 program. Students were asked to place the word in the puzzle with the help of given picture.

*Matching:* Including activities such as drag and drop, Matching game like Puzzle game were developed through The Hot Potatoes 6 program. In this game, students were asked to drag words or phrases to the correct pictures or match the picture with the word.

All of these games were applied to students on an individual basis in the laboratory under the supervision of teacher and researcher for 2 hours per week. During the application, students were given guidance on only technical problems. One of the differences between DENIS and game applications is that the software applied vocabulary teaching unit by unit in a sequence, whereas in the game applications, while playing whichever game they liked, the students learned the vocabulary items in a mixed form from the pool of 120 words. That is to say, while students were exposed to 40 words per week in the implementation of DENIS, the students learned 120 words in a mixed form in three weeks by playing the games.

***Data Analysis***

In order to test the research questions, two-factor ANOVA, multiple comparison tests (Bonferroni), T-test and descriptive statistics for related samples were used.

## Results

The 1st Research question investigates whether there is a significant difference between the vocabulary learning achievements of the grade 6 students who learn vocabulary in the educational software (DENIS) and computer game settings.

a) Is there a significant effect of DENIS applications on vocabulary achievement scores of the 6th grade students?

One way ANOVA for repeated measures was applied to figure out whether there is a significant difference between the tests applied in the 1st, 4th and 9th weeks in the process of implementation. The analysis was performed on the basis of scores obtained from the first 25 items which consisted of the vocabulary in DENIS. Table 3 displays descriptive statistics of the DENIS application achievement test. ANOVA test results are presented in Table 4.

**Table 3.** Descriptive Statistics of DENIS Application Achievement Test

| Measures | $\bar{X}$ | Sd |
|---|---|---|
| 1. measure | 8.15 | 3.11 |
| 2. measure | 15.82 | 5.12 |
| 3. measure | 15.59 | 5.15 |

**Table 4.** Test Results for Repeated Measures of ANOVA for DENIS

| Source of Variance | Sum of Squares | df | Mean squares | F | p | Partial eta-square |
|---|---|---|---|---|---|---|
| Between subjects | 3162.26 | 67 | 47.20 | | | |
| Measure | 2592.04 | 1.29 | 2005.11 | 170.16 | 0.000 | 0.717 |
| Error | 1020.63 | 86.61 | 11.78 | | | |
| Total | 6774.93 | 154.9 | | | | |

When examined, the Mauchly's test conducted to test the assumptions of the analysis (Sphericity W (2) = .453, p <.05) it was found that the assumptions were violated. Greenhouse-Geisser correction was used to ensure assumptions. ANOVA results indicate that there are significant differences between the measurements. Bonferroni multiple comparison test was conducted to figure out which measurements significantly differed from each other. The results are displayed in Table 5. These results revealed that while there was a significant difference between measurements 1 and 2. there was no significant difference between measurements 2 and 3. These results suggest that there is a significant increase in the success of the students after the application of DENIS. The availability of significant difference between the 1st and 3rd measurements indicate that the success did not change in time after the application of DENIS.

**Table 5**. Bonferroni Test Results for Multiple Comparisons for DENIS.

| Comparison | | Mean difference | Standard | p |
|---|---|---|---|---|
| I | J | (I-J) | Error | |
| 1. measure | 2. measure | -7.676* | .549 | .000 |
| | 3. measure | -7.441* | .559 | .000 |
| 2. measure | 1. measure | 7.676* | .549 | .000 |
| | 3. measure | .235 | .242 | 1.000 |
| 3. measure | 1. measure | 7.441* | .559 | .000 |
| | 2. measure | -.235 | .242 | 1.000 |

b) Is there a significant effect of Game applications on vocabulary achievement scores of the 6th grade students?

One way ANOVA for repeated measures was applied to figure out whether there is a significant difference between the tests applied in the 1st, 4th and 9th weeks in the process of implementation. The analysis was performed on the basis of scores obtained from the first 25 items which consist of the vocabulary in Games. Table 6 displays descriptive statistics of Games application achievement test. ANOVA test results are presented in Table 7.

**Table 6.** Descriptive Statistics of DENIS Application Achievement Test

| **Measures** | $\bar{X}$ | **Sd** |
|---|---|---|
| 1. measure | 10.66 | 3.79 |
| 2. measure | 11.59 | 4.75 |
| 3. measure | 18.37 | 5.37 |

**Table 7.** Test Results for Repeated Measures of ANOVA for Games

| Source of Variance | Sum of Squares | df | Mean squares | F | p | Partial eta-square |
|---|---|---|---|---|---|---|
| Between subjects | 3488.02 | 67 | 52.06 | | | |
| Measure | 2407.19 | 1.73 | 1394.85 | 175.41 | 0.000 | 0.724 |
| Error | 919.48 | 115.63 | 7.95 | | | |
| Total | 6814.69 | 184.36 | | | | |

When examined the Mauchly's test conducted to test the assumptions of the analysis (Sphericity W (2) = .453, p <.05) it was found that the assumptions were violated. Greenhouse-Geisser correction was used to ensure assumptions. ANOVA results indicate that there are significant differences between the achievements of students as measured at different times. Bonferroni multiple comparison test was conducted to figure out which measurements are different from each other. These results revealed that there was no significant difference between measurements 1 and 2, while significant differences were found between measurements 1 and 3.These results suggest that there is a significant increase in the success of the students who are learning in the game environment. On the other hand, the unavailability of difference between the 1st and 2nd measurements supports the finding that the students' learning was actualized through game application.

**Table 8.** Bonferroni Test Results for Multiple Comparisons for Games

| **Comparison** | | **Mean difference** | **Standard** | **p** |
|---|---|---|---|---|
| **I** | **J** | **(I-J)** | **Error** | |
| 1. measure | 2. measure | -.926 | .385 | .056 |
| | 3. measure | -7.706* | .530 | .000 |
| 2. measure | 1. measure | .926 | .385 | .056 |
| | 3. measure | -6.779* | .421 | .000 |
| 3. measure | 1. measure | 7.706* | .530 | .000 |
| | 2. measure | 6.779* | .421 | .000 |

c) Is there a significant effect of combined applications (educational software (DENIS) and computer game settings) on vocabulary achievement scores of the 6th grade students?

In order to investigate whether the combined applications (DENIS and Games) have an effect on students' achievement scores, a paired samples t-test was applied to see the united effect of applications in this analysis. The paired samples t test results for the achievement test are displayed in Table 9. The results reveal that the applications of DENIS and Games significantly increased students' vocabulary learning achievement scores.

**Table 9.** Paired Samples t Test Results for Achievement Test

| | N | $\bar{X}$ | sd | df | t | p |
|---|---|---|---|---|---|---|
| Pre test (50 items) | 68 | 18.81 | 6.03 | 67 | -16.90 | 0.000 |
| Post test (50 items) | 68 | 33.96 | 9.82 | | | |

The 2nd Research Question was expressed as "Do Computer-assisted vocabulary learning settings and gender have an impact on vocabulary learning strategies of 6th Grade students?" In the investigation of this question, the scores obtained from vocabulary learning strategies scale applied to the students before and after the experimental processes were compared. For this, paired samples t-test was conducted.

**Table 10**. Paired Samples T-test Results for Vocabulary Learning Strategies

| | N | $\bar{X}$ | Sd | df | t | p | Eta Square |
|---|---|---|---|---|---|---|---|
| Memory Pre-test | 68 | 3.38 | 6.264 | 67 | 1.262 | .211 | |
| Memory post-test | 68 | 3.26 | 5.571 | | | | |
| Cognitive pre-test | 68 | 2.91 | 4.666 | 67 | 1.141 | .258 | |
| Cognitive Post-test | 68 | 2.78 | 4.138 | | | | |
| Compensation pre-test | 68 | 2.86 | 4.399 | 67 | -2.021 | .047 | .05 |
| Compensation post-test | 68 | 3.15 | 4.512 | | | | |
| Meta-cognitive pre-test | 68 | 3.60 | 3.452 | 67 | -1.402 | .165 | |
| Meta-Cognitive Post-test | 68 | 3.76 | 3.372 | | | | |
| Affective Pre-Test | 68 | 3.49 | 4.497 | 67 | .423 | .673 | |
| Affective post-test | 68 | 3.45 | 5.014 | | | | |
| Social pre-test | 68 | 3.27 | 5.328 | 67 | .429 | .669 | |
| Social post-test | 68 | 3.22 | 5.026 | | | | |
| Total Pre-test | 68 | 3.27 | 23.746 | 67 | .097 | .923 | |
| Total post-test | 68 | 3.26 | 20.565 | | | | |

According to the results in Table 10, significant differences were found between the mean scores (t (67) = -2.021, p = .047) of subscale compensation strategies. Although total scale scores and the other five sub-dimensions mean scores showed a difference, the difference was not statistically significant.

Independent samples t-test were carried out to determine whether vocabulary learning strategies changed according to gender.

**Table 11**. Independent samples T-test results for vocabulary learning strategies scale according to gender

| | Gender | N | $\bar{X}$ | Sd | df | t | p |
|---|---|---|---|---|---|---|---|
| **Pre-test** | | | | | | | |
| Memory | Female | 40 | 3,21 | 6.437 | 66 | -1.861 | .067 |
| | Male | 28 | 3,62 | 5.716 | | | |
| Cognitive | Female | 40 | 2,00 | 4.306 | 66 | -1.238 | .220 |
| | Male | 28 | 2,20 | 5.101 | | | |
| Compensation | Female | 40 | 2,63 | 4.374 | 66 | -2.130 | .037* |
| | Male | 28 | 3,19 | 4.160 | | | |
| Metacognitive | Female | 40 | 3,52 | 3.555 | 66 | -.961 | .340 |
| | Male | 28 | 3,72 | 3.304 | | | |
| Affective | Female | 40 | 3,39 | 4.693 | 66 | -1.336 | .186 |
| | Male | 28 | 3,64 | 4.128 | | | |
| Social | Female | 40 | 4,76 | 4.790 | 66 | -1.098 | .276 |
| | Male | 28 | 5,12 | 6.003 | | | |
| Total | Female | 40 | 3,14 | 23.145 | 66 | -1.774 | .081 |
| | Male | 28 | 3,46 | 23.702 | | | |
| **Post-test** | | | | | | | |
| Memory | Female | 40 | 3,14 | 5.600 | 66 | -1.543 | .128 |
| | Male | 28 | 3,44 | 5.388 | | | |
| Cognitive | Female | 40 | 2,01 | 4.455 | 66 | .327 | .745 |
| | Male | 28 | 1,96 | 3.710 | | | |
| Compensation | Female | 40 | 3,09 | 4.990 | 66 | -.550 | .584 |
| | Male | 28 | 3,24 | 3.786 | | | |
| Metacognitive | Female | 40 | 3,75 | 3.545 | 66 | -.085 | .932 |
| | Male | 28 | 3,77 | 3.173 | | | |
| Affective | Female | 40 | 3,48 | 5.497 | 66 | .330 | .742 |
| | Male | 28 | 3,41 | 4.316 | | | |
| Social | Female | 40 | 4,75 | 5.337 | 66 | -.652 | .517 |
| | Male | 28 | 4,95 | 4.598 | | | |
| Total | Female | 40 | 3,23 | 22.594 | 66 | -.559 | .578 |
| | Male | 28 | 3,31 | 17.524 | | | |

* p < .05 ** p < .05

The results in Table 11 revealed that male students ($\bar{X}$ = 3.19) used compensation strategies more than female students ($\bar{X}$= 2.63) before the implementation (t (66) = -2130. P <.05). A significant difference was not found in other strategies and post-test results in terms of gender.

## Discussion and Conclusion

There were two main goals in this study. One of them was to determine in which educational software, grade 6 students are more successful in learning vocabulary. The other was to determine how much the vocabulary learning strategies alter with computer assisted vocabulary learning applications.

In order to test the first question of the study, a one-group experimental setting of repeated measures was developed. A nine-week application process was carried out with grade 6 students using the software developed by the researchers. Vocabulary was taught with the help of two separate educational softwares (DENIS and Games) and the success of the students in pre, mid and post-tests were compared. After the analysis, it was concluded that both types of softwares had positive effects on vocabulary learning whereas the game software improved the success of the students more than DENIS did. When the literature was reviewed, a positive contribution of game applications to the success were encountered in many studies supporting that games increase the motivation of the students and make learning process fun (Dyck, Pinella, Brown & Gutwin, 2003; O'Neil, Wainess & Baker, 2005, Ellis, Heppell, Kirriemuir, Krotoski, & McFarlane, 2006; Whitton, 2007).

To test the second main objective of the study, a foreign language vocabulary learning strategies scale (Kocaman & Kızılkaya Cumaoğlu, 2014) was applied at the beginning and end of the application process. When pre and post-test scores of the scale were compared to subscale and total scores, it was concluded that the use of compensation strategies by the students increased significantly.

The studies conducted by Demirel (2012), Chi-Him Tam (2013), Chang, Liu & Lee (2007), Alexandros (2012), Andrew (2011) on language learning strategies revealed that compensation strategies were most widely used by the participants. The study conducted by Sarıçoban & Sarıcaoğlu (2008) for the purpose of identifying the strategies used by the students and the teachers revealed that metacognitive and compensation strategies are the most favoured strategies by both students and teachers. In the light of research conducted in the field, it can be deduced that computer assisted vocabulary learning feeds the widely used dimension of compensation strategies. Hence, Groot (2000) refers to the value of designing computer-assisted vocabulary software products in terms of broadly approved strategies in vocabulary acquisition. From this point of view, he emphasizes the improvement of computer-assisted vocabulary software that involves different features of vocabulary.

From the results of research, software developers may be encouraged to develop an instructional design which will increase the use of strategy in teaching languages. Besides, Instructors could be recommended to take the level of the students into consideration while selecting and using such software. Studies which will be conducted to show in which sub-dimensions strategy use affect success more will guide teachers about which strategies they should be teaching.

In the study, vocabulary learning strategies were also analysed to see whether they changed according to gender. When strategy use was analysed according to the gender, it was found out that compensation strategies are more used by male students than female students.

The results of the experimental study conducted by Hong-Nam and Leavell (2006) revealed that females employed learning strategies more frequently than males tended to use metacognitive and compensation strategies most and affective strategies the least. Female participants reported using social and metacognitive strategies most and memory strategies the least.

In the future studies, Conducting experimental studies related to the types of software that can be used in teaching vocabulary in computerized settings, it can be searched what kind of software

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