Self-regulated Vocabulary Strategy Use: Implications for CALL and Individual Variables[1]

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Abstract

This study compared the students' use of self-regulated vocabulary strategies (SRVS) in texts with L1 and L2 marginal glosses and those accompanied by technology-enhanced materials on the computer. The study also compared strategy use across L2 proficiency level, gender, and age. Experimental group 1 (n=80) was taught new vocabulary items in the form of printed textual definition coupled with still pictures. Experimental group 2 (n=52) was taught via marginal glosses in L1 and Experimental group 3 (n=47) was taught via marginal glosses in L2. All the participants were asked to fill out the self-regulating capacity in vocabulary learning scale (SRCvoc) developed by Tseng et al (2006). A think-aloud protocol was used with some of the students to identify if they actually needed or used the strategies. The results of a one way ANOVA showed significant differences (p <0.05); and the Tukey *post-hoc* test showed that there was a significant difference only between the texts with still pictures and those with L1 and L2 marginal glosses. Most probably this occurred because the verbal definition plus the visual is more helpful than just L2 or L1 due to two channels. There was no significant difference between L1 and L2 marginal glosses. Regression analyses indicated that vocabulary strategy use was influenced by individual variables.

Resumen

Este estudio compara los estrategias del uso de vocabulario auto-regulado (SRVS) en textos con anotaciones en L1 y L2 en los márgenes y aquellos acompañados con materiales en la computadora. El estudio también compara el uso de estrategias en competencia en el L2, genero y edad. Al grupo experimental 1 (n=80) se le enseñó nuevo vocabulario en la forma de definiciones impresas textuales acoplados con imágenes fijas. Al grupo experimental 2 (n=52) se le enseñó a través de anotaciones marginales en L1 y el grupo experimental 3 (n=47) vía anotaciones en L2. A todos los participantes se les requería llenar la escala de aprendizaje de vocabulario auto-regulado (SRCvoc) desarrollado por Tseng et al (2006). Se siguió el protocolo de pensar en voz alto con algunos estudiantes para identificar si de hecho necesitaban o usaban las estrategias. EL resultado del unidireccional ANOVA mostró diferencias importantes (p<0.05); y la prueba posthoc de Tukey mostró que existía una diferencia importante sólo entre los textos con imagen fija y aquellos con anotaciones marginales en L1 y L2. Muy probablemente esto ocurrió debido a la definición verbal más la visual apoya más que sólo L2 o L1. No hubo diferencias importantes entre las anotaciones marginales en L1 y L2. Un análisis regresional indica que la estrategia del uso de vocabulario estuvo influido por variables individuales.

Introduction

More than three decades have elapsed since the beginning of studies in the area of language learning strategies (Naiman, Frohlich, Stern, & Todesco, 1978). While research in this area has provided some illuminative views about the characteristics of good learners, it has been unable to persuade scholars that the application of

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strategies by good language learners is in a fruitful direction. Scholars have come to recognize that what makes strategic learners special is the "the actual strategies and techniques they apply to enhance their own learning" (Tseng, Dörnyei, & Schmitt, 2006, p. 79). As a result of this paradigm shift, the study of learners' self-regulated behavior has become an important part of educational psychology.

Self-regulation refers to the process by which people initiate, adjust, interrupt, terminate or otherwise alter actions to promote the attainment of personal goals, plans or standards (Baumeister & Heatherton, 1996). The conceptualization of self-regulation involves a number of integrated and interrelated processes of which the use of language-related strategies is only one. It is well known that these strategies can be employed in all domains, and vocabulary learning is the domain of focus in this paper.

Self-regulated vocabulary strategies can be employed to teach students multiple cognitive and metacognitive processes to facilitate and enhance performance in both academic and nonacademic contexts. The obvious goal is that of teaching students to monitor and regulate their thinking and learning processes.

This study concentrates on five broad aspects of self-regulation in vocabulary learning: commitment control, metacognitive control, satiation control, emotion control, and environmental control (Tseng et al, 2006). The taxonomy of self-regulated vocabulary learning strategies have been researched by Tseng et al. (2006) in traditional learning environments and needs to be reassessed in computer-mediated learning environments. In other words, as computer-mediated learning has grown self-regulated learning has received much significance (Boekaerts, Pintrich, & Zeidner, 2000). Some researchers showed that the importance of the environment and its influence on personal factors is in keeping with social cognitive views of self-regulation (Artino, 2008).

Studies have moved away from a narrow focus on language gains or other discrete aspects of second language acquisition; many current inquiries apply various methods of instruction, thus documenting the complexity of language learning far beyond the earlier standpoints. The role of context is an important factor to consider in the learning design if learning is seen as being grounded in the student's experience. In the design of CALL programs, this suggests a need to consider the specific implications of the range of contexts in which learning might take place. As the computer-based learning environment is characterized with autonomy, self-regulation becomes a critical factor for success in technology-enhanced learning. If the self-regulatory learning skills are important to the success of learning in the traditional face-to-face classrooms, it can be expected that these self-regulatory learning skills will play an even more important role in the recent technology-enhanced environments. The employment of the self-regulatory skills requires the individual to regulate, manage, and navigate a situation or environment successfully, thus making the study of self-regulation especially relevant to the computer-mediated learning environment. Also, self-regulatory skills have been noted as being positively associated with academic achievement (Nota, Soresi, & Zimmerman, 2004; Schunk & Zimmerman, 1998; Zimmerman & Schunk, 2001).

The context of learning has been suggested as a factor influencing the way students approach their learning. The effects of technology-enhanced environment on learning have often been examined in empirical research (Severiens, Ten Dam, & Wolters, 2001). But there has been no attempt, as far as we are aware of, to investigate the effect of technology-enhanced environment on the use of self-regulated strategy use. Therefore, further research is warranted to compare the self-regulated vocabulary skills of learners in traditional environments and technology-enhanced classrooms.

Literature Review

What comes below is a brief discussion of vocabulary learning strategies as well as current approaches to vocabulary learning with a focus on variables of interest in the study including gender, age and language proficiency. A sample of recent research in these areas is also surveyed to pave the way for our study.

Vocabulary Learning Strategies (VLS)

Learner-related variables, and especially learning strategies, determine success in language learning. Different scholars have defined learning strategies a bit differently based on the theoretical orientations they adopted. In Oxford's (1990) words, "…learning strategies are operations employed by the learner to make learning easier, faster, more enjoyable, more self-directed, more effective, and more transferable to new situations" (p. 8). One system of learning strategies was developed by Oxford (1990), in which she identified two broad types of strategies:

- direct strategies, and
- indirect strategies.

The direct type is composed of memory strategies for remembering and retrieving new information, cognitive strategies for understanding and producing the language, and compensation strategies for using the language despite knowledge gaps. Indirect strategies include metacognitive strategies for coordinating the learning process, affective strategies for regulating emotions, and social strategies for learning with others (Oxford, 1990).

"Vocabulary Learning Strategies (VLS) constitute a subclass of language learning strategies which are applicable to a wide variety of language learning tasks" (Segler, Pain, & Sorace, 2002). Their place and importance in language learning can be linked to the observation that a vast majority of strategies in taxonomies such as Oxford's are either VLS (all strategies in the memory category), or can be used for vocabulary learning tasks. Having clarified the meaning and the role of VLS, we next discuss a selection of approaches to language learning.

Current Approaches to Vocabulary Learning

Vocabulary learning is considered to be a significant subcomponent of not only a traditional instruction but also a CALL program (Abraham, 2008; Brown, 2011; Li, 2010; Mizumoto & Takeuchi, 2009; Qing & Kelly, 2006). In order to make input more comprehensible, "the integration of multimedia gloss into L2 reading material has been suggested as an effective way of fostering vocabulary acquisition due to its authenticity, salience, and nonlinearity" (Yun, 2011, p. 39). The increasing use of multimedia materials for second language teaching poses issues regarding the

effectiveness of hypermedia environments for language learning. One area that has received attention is the impact of using multimedia glosses on vocabulary learning. The following section will review some of the glossing options examined by scholars in this area.

Text-based Glossing

Text-based glossing introduces verbal and textual information along with annotating words in a hypermedia environment. There might be different types of verbal information such as L1 glossing (translation in the native language), L2 glossing (definition, synonym or antonym), L1 multiple-choice glossing (where learners are asked to select the best translation from a set of alternatives), L2 dictionary definition, use of sentence contexts (which illustrate how the target word is used in a sentence designed to provide clues to its meaning), cultural notes, questions or references and so on. The effectiveness of text-based glossing in hypermedia environments especially for incidental learning has been emphasized by scholars (Al-Seghayer, 2001; Chun & Plass, 1996).

Abraham (2008) provided a meta-analysis of eleven studies on the effectiveness of computer-mediated text glosses in comprehending authentic L2 readings and in acquiring vocabulary. The results of the meta-analysis showed that those learners who had access to computer-mediated text glosses performed much better on authentic reading comprehension and vocabulary acquisition tasks than those who did not have such support. The study also investigated the role of individual variables on authentic reading comprehension and incidental vocabulary acquisition. The individual variables consisted of level of proficiency, text type, and type of assessment. Overall, the findings showed that computer-mediated glosses were effective only for the higher levels of proficiency and less effective for the beginning level learners. With regard to the role of text type on vocabulary retention and reading comprehension, Abraham (2008) concluded that "computer-mediated glosses had a medium effect on expository texts and a large effect on narrative texts" (p. 211). And with regard to the type of assessment, he came to the conclusion that receptive tests were more efficient than productive tests.

A study was conducted by Yoshii (2006) to compare the effectiveness of L1 and L2 glosses in a multimedia environment with Japanese university EFL students. The study revealed that there were beneficial effects for both L1 and L2 gloss types. However, the results showed that in the long run, L1 glosses were more effective than L2 glosses or L2 glosses plus picture annotations due to the rate of vocabulary acquisition.

The results of other studies showed similar results with regard to the effectiveness of L1 glosses over L2 glosses (e.g., Davis & Lyman-Hager, 1997; Lomicka, 1998; Nagata, 1999). AbuSeileek (2011) investigated the effects of gloss types and locations on reading and vocabulary acquisition. In addition to a control group which received no glosses, target words in the reading texts were glossed in the following ways: after the glossed word, in a pop-up window, in the margin, and glosses at the bottom. The findings of this study clearly showed that the hypermedia glosses had a significant effect on learners' vocabulary retention and reading comprehension compared to the control group. Among the three treatment conditions, the "after glossed word" group outperformed the other groups of

"margin", "pop-up window" and "bottom" in both vocabulary acquisition and reading comprehension.

Multimedia Glossing

In a multimedia environment, teachers can introduce new words using support from different types of visual information. These may include pictures, video clips, and animations. Research has shown positive effects for multimedia glossing on vocabulary acquisition. Al-Seghayer (2001) in an in-depth study compared three different types of glosses: printed L2 textual definition alone, printed L2 textual definition coupled with still pictures, and L2 textual definitions coupled with video clips. The results of this study showed significant effects for the printed textual definitions coupled with video clips over the use of textual definitions coupled with still pictures.

Iranian EFL Payame Noor University learners' use of self-regulated learning strategies (SRLS) in print-based and computer-based environments was the focus of a study by Farajollahi and Moenikia (2010). As expected by the researchers, the findings showed that computer-based students outperformed print-based participants. The authors attributed this observation to the fact that "students feel autonomous in computer-based learning environments, so their SRLS are promoted" (p. 3692).

Despite the significance of the multimedia environment in fostering the vocabulary retention and language learning, little research has been conducted in this area. Therefore, further empirical research is needed to answer a number of questions that are still unaddressed. As far as this study is concerned, we are interested in finding the link between self-regulated vocabulary learning strategies and type of gloss used for teaching vocabulary on the one hand, and the relationship between gender, age, language proficiency and the use of SRVS on the other.

Self-regulation and Gender

Generally, studies show that women set lower expectancies of success than men in achievement areas (cf., Crandall, 1969; Maccoby & Jacklin, 1974). Accordingly, it is assumed that women set lower goals and choose to deal with much easier tasks. One study by Strube, Lott, Le-Xuan-Hy, Oxenberg, & Deichmann (1986) showed that 75.8% of women and only 49.4% of men preferred easy tasks over difficult ones. This means that women tend to set lower goals and seem to manifest less efficient self-regulated behaviors. However, not all studies point to the same findings. Studies (e.g., Beyer, 1998; Beyer & Bowden, 1997) that examined gender differences in three types of task including masculine, feminine, and neutral, led to interesting findings: there was gender bias only in masculine tasks (such as mathematics, physics, and technical problems) and no gender difference was found in feminine or neutral tasks. It seems that there are still no conclusive findings on gender differences in self-regulated behaviors and there is a need for more direct investigations of self-regulation processes and gender differences.

Self-regulation and Age

The misconception that children are so similar to one another that there is no real need to focus on individual differences (ID) in the field of English Language

Learning (ELL) is widespread. Such a misconception is true not only of attitudes, motivation, learning styles, and aptitude, but also of self-regulatory capacity, something that has only recently been recognized as worth researching in learners. Research suggests that the age of the learners partly determines their self-regulatory behaviors (e.g., Benson & Samarawickrema, 2009). According to Benson and Samarawickrema (2009), approaches that emphasize the significance of the learner's experience and recognize the multiplicity of contextual factors which can influence learning are especially relevant when the learners are adults who are taking advantage of the flexibility offered by e-learning.

The above concerns call for a comprehensive study of self-regulatory behaviors of both young and adult language learners; however, there does not seem to have been any attempts of systematic analyses investigating the relationship between age and self-regulatory strategies. Given the paucity of research examining the relationship between learners' age and their self-regulated behaviors, there does seem to be a need for conducting a study investigating the link between SRVS and learners' age.

Vocabulary and Proficiency Level

Studies have shown different results for vocabulary acquisition with learners of different proficiency levels (e.g., Abraham, 2008; Knight, 1994; Miyasako, 2002; Yoshii, 2006). The results of the study conducted by Abraham (2008) showed that computer-based glosses had a medium effect on the learners' reading comprehension and a large positive effect on vocabulary acquisition. Furthermore, the computer-mediated gloss was more beneficial for learners of higher level of proficiency than for beginning learners because "beginning L2 learners may need to achieve a threshold level of vocabulary knowledge before being able to retain words presented in glosses" (Abraham, 2008, p. 211).

A study was carried out by Miyasako (2002) investigating the role of Japanese high school learners' proficiency level on gloss types. The results showed that the L1 gloss mode was more positively related to lower levels of proficiency and the L2 gloss mode was more effective for higher levels of proficiency. Knight's study (1994) indicated that the use of computer-mediated bilingual dictionaries had a positive effect on vocabulary retention and this effect was much greater for learners at lower levels of proficiency. Knight's justification was that the use of bilingual computer-mediated dictionaries enabled the lower level students to catch up with more advanced students.

The findings from these studies yield inconsistent conclusions regarding the role of level of proficiency in vocabulary retention. Some studies (e.g., Knight, 1994; Miyasako, 2002) support the conclusion that computer-mediated glosses are more effective for learners at lower levels of proficiency to give them the adequate support to catch up with more advanced learners. Other investigations, however, (e.g., Abraham, 2008; Loucky, 2003) advocate the use of CALL programs with more advanced learners because advanced level learners are claimed to use computer-mediated glosses more effectively than the beginning level learners. These inconsistent findings encourage more empirical and longitudinal research programs to bridge the gap and provide answers to many of the unanswered questions.

Research Questions

The aim of this study was to compare the learners' use of self-regulatory vocabulary strategies in classes employing paper-based materials and those using technology-enhanced materials on the computer. More specifically, this research was intended to answer the following research questions:

1. What is the relationship between the types of gloss (computer-mediated glosses vs. traditional L1/L2 marginal glosses) and the use of self-regulated vocabulary strategies?

2. What is the relationship between the learners' gender and the use of self-regulated vocabulary strategies?

3. What is the relationship between the learners' age and the use of self-regulated vocabulary strategies?

4. What is the relationship between the learners' proficiency level and the use of self-regulated vocabulary strategies?

Using principles of quantitative research, the above questions were tentatively answered in the form of null-hypotheses to be tested at the probability level of 0.05 and the following procedures were employed to provide answers to them.

Method

This research study was primarily quantitative in nature. However, since think-aloud protocols were also used to provide further information, the study can be labeled as a mixed-approach design. The dependent variable of the study was self-regulated vocabulary learning strategies and the four independent variables were the types of gloss, gender, age and proficiency level. To provide answers to the questions posed in the earlier section, six classes of EFL students took part in different phases of the study as explained in detail below.

Participants

The participants included 94 low intermediate and 85 advanced Persian-speaking learners of English. All of the participants were EFL learners who were taking formal classes in different language centers in Tehran, Iran.

The intermediate participants were selected from 143 learners based on their proficiency scores. They were homogeneous in terms of age and English education background. In general, their ages ranged from 11 to 17 (young learners) and they had all received English instruction at the same language center before enrolling in the course. They were all junior and senior high school students at the time of the study. None of them had lived in an English speaking country prior to participating in the study.

The advanced participants were chosen based on their proficiency scores out of 92 learners. At the time of the study, they were university students in different fields such as Economics and Persian Linguistics and they had not lived in or travelled to an English speaking country before. They had studied English formally in junior and senior high schools for a total of six years before entering university. Also, their ages ranged from 18 to 25 and they were categorized as adult learners in the present study. The criterion for grouping learners into young and adult categories

was based on whether they were secondary school/senior high school students (aged up to 17) or tertiary education/university students (18+).

Six intact classes served as the three experimental groups to whom the vocabulary glosses were taught. Experimental group 1 (n=80) consisted of a class of 40 young (aged between 11 to 17) female students at the low intermediate level of proficiency and another class of 40 advanced male students between the ages of 18 to 25 years. Experimental group 1 participants were taught new vocabulary items using printed textual definition coupled with still pictures shown on the computer screen. Experimental group 2 (n=52) included a class of 30 low intermediate-female participants and another class of 22 advanced level male students. They were taught the new vocabulary items via marginal glosses in L1. And experimental group 3 (n=47) was made of a class of 24 low intermediate level female participants and another class of 23 advanced level male students who were taught the lexical items via marginal glosses in L2. Table 1 shows the distribution of the participants in the study.

Classes	N	Age	Level of proficiency	Gender	Educational background
Class A (experimental group 1)	40	11-17	low intermediate	female	high school
Class B (experimental group 1)	40	18-25	advanced	male	university
Class C (experimental group 2)	25	11-17	low intermediate	female	high school
Class D (experimental group 2)	27	18-25	advanced	male	university
Class E (experimental group 3)	24	11-17	low intermediate	female	high school
Class F (experimental group 3)	23	18-25	advanced	male	university

Table 1. Characteristics of Participants in the Study

Instrumentation

SRCvoc Scale

The instrument used for eliciting data on learners' strategies was the self-regulating capacity in vocabulary learning scale (SRCvoc) developed by Tseng et al. (2006). The instrument was based on a theoretical construct from the area of educational psychology developed by Dörnyei (2005). There is no mention by the designers of the instrument or in the literature as to its sensitivity to gender, age and language proficiency and this study was indeed meant to find out whether candidates with different age-ranges, gender and proficiency levels perform differently on this questionnaire. This system consists of five facets (Tseng et al., 2006):

1. Commitment control: this helps to preserve or increase the learners' original goal commitment (e.g., keeping in mind favorable expectations or positive incentives and rewards, focusing on what would happen if the original intention failed);

2. Metacognitive control: this involves the monitoring and controlling of concentration, and the curtailing of any unnecessary procrastination (e.g., identifying recurring distractions and developing defensive routines, focusing on the first steps to take when getting down to an activity);

3. Satiation control: this helps to eliminate boredom and to add extra attraction or interest to the task (e.g., adding a twist to the task, using one's fantasy to liven up the task);

4. Emotion control: it is concerned with the management of disruptive emotional states or moods, and the generation of emotions that will be conducive to implementing one's intentions (e.g., self-encouragement, using relaxation and meditation techniques); and

5. Environmental control: this helps to eliminate negative environmental influences and to exploit positive environmental influences by making the environment an ally in the pursuit of a difficult goal (e.g., eliminating distractions, asking friends to help and not to allow one to do something). (pp. 85-86)

The SRCvoc is a 6-point Likert scale (6 = strongly agree; 1 = strongly disagree). Each of the five facets in the scale included four items. The reliability of the questionnaire as used in the present study was computed using the Cronbach Alpha method which turned out to be 0.85. The instrument was used in its original form without any modifications.

Proficiency Tests

Two types of proficiency tests were administered to the participants with regard to their educational background. An adapted Institutional TOEFL test was administered to adult/advanced learners since they had six years of previous English education at school and were pursuing an advanced course in the language center. The young participants, however, were given an adapted Institutional PET, which is a simpler test compared to TOEFL and which is therefore more suitable for participants of lower proficiency. The listening and grammar parts were excluded from both proficiency tests for practicality considerations. Both tests were scored on a scale of 1-100. Table 2 displays the mean values, the number of items, and standard deviations for the proficiency tests used in the study.

Tests	N (number of items)	Mean	Std. Deviation
Adapted TOEFL	50	64.12	18.18
Adapted PET	35	58	14.8

Table 2. Number of Items, Means and Standard Deviations of Proficiency Tests

Reading Materials

Nine reading passages of about 300 words each were used. They were selected from Intermediate Steps to Understanding (Hill, 1980a) and Advanced Steps to Understanding (Hill, 1980b) with regard to the participants' level of proficiency. The texts coming from the former book were intended for young candidates as they were low intermediate in proficiency, and those coming from the latter were used for adults as they were advanced learners. Text difficulty level (unfamiliar words to the students), interest, and text suitability were adjusted to the participants of the study. The topics which were practiced in the classroom were of a general content and were deemed suitable for the participants. These reading passages were the basis according to which the new vocabulary items were taught.

Think-aloud Protocol

The think-aloud technique for the elicitation of verbal reports was employed since this procedure is a useful technique for tracking changes in the contents of working memory during comprehension (Whitney & Budd, 1996). Only five participants from each group were selected from each group which is a characteristic of qualitative inquiry limiting the number of participants. The five students of experimental group 1 were 2 advanced male students of 20 and 21 years of age and three low intermediate female learners with 11, 15 and 16 years of age. Experimental group 2 participants were three low intermediate level female students of 11, 12 and 14 years of age, and two advanced level male students of 18 and 20 years of age. Finally, experimental group 3 participants were two advanced level male students whose ages were 24 and 25 years and three low intermediate level female learners of 12, 13 and 14 years of age.

Prior to the collection of the data, a preparatory meeting was held with these participants individually in order to train them in the procedure of thinking aloud. Following the training session, the participants started reading the text containing new words annotated by all the three glossing modes: L1 gloss, L2 gloss and computer-based gloss. When the participants finished reading the text, they were asked to verbalize their understanding of the text in whatever language was most comfortable (English or Persian). Following this, eight comprehension questions and questions asking the meaning of new words were presented to the participants. The researchers asked the participants to answer the questions and verbalize their thoughts while doing so. Upon completing each task, the participants were told to verbalize the reason they responded as they did. The participants were interviewed individually, and the interviews were tape-recorded and transcribed later. Table 3 shows the distribution of the candidates in the qualitative phase of the study.

Groups	N	Age (year)	Level of proficiency	Gender	Educational background
experimental group 1	3	13,15,16	low intermediate	female	high school
experimental group 1	2	20,21	advanced	male	university
experimental group 2	3	11,12,14	low intermediate	female	high school
experimental group 2	2	18,20	advanced	male	university
experimental group 3	3	12,13,14	low intermediate	female	high school
experimental group 3	2	24,25	advanced	male	university

Table 3. Distribution of Students in Qualitative Analysis

Procedure

Before the experiment, the participants were surveyed for age, years of studying English, proficiency level, and courses attended. Those participants who were given the TOEFL test were adult (aged 18 to 25) university learners of similar educational background. And those participants who were given the adapted Institutional PET were male and female young learners (aged 11 to 17) of similar educational background. All of the participants spent the same time attending to the passages. Experimental group 1 was taught via printed materials accompanied by a computer

and the two other groups were taught via printed materials (experimental group 2 in L1; experimental group 3 in L1) for nine weeks and then the participants filled up the SRCvoc questionnaire. The participants in experimental group 1 were taught those vocabulary items that were identified by the teacher to be outside of the students' vocabulary knowledge. And in this process, the participants in experimental group 1 were instructed the new items via employing pictures depicted on the computer screen. The participants in the other experimental groups were taught the new vocabulary items using marginal L1 and L2 glosses in their books. That is, while experimental group 1's participants were taught the new items using the computer screen, the other groups' participants were taught using marginal glosses in their books.

The scores from the five facets of SRCvoc were used for the test of differences between the groups as reported in the results section. Some of the questions asked during the interviews were: Did you understand what you just read? Do you have a clear picture in your head about this information? What were the most important points in this reading? Did you understand the vocabulary items better with their accompanying glosses (different gloss types in each group)? These questions were asked in the students' native language to prevent misunderstandings.

Data Analysis

As far as qualitative data was concerned, each of the 15 think-aloud protocols was analyzed carefully and notes were made relating to the test takers' use of information from the questions in constructing meaning.

Regarding quantitative data, as noted above, a significance level of 0.05 (p<0.05) was set. Statistical Package for the Social Sciences (SPSS) version 17 for personal computers was used to compute descriptive statistics and perform reliability analyses, ANOVA, and Regression.

Results

What follows are the quantitative and qualitative analyses of the elicited data. First, the relationship between glossing type and self-regulated vocabulary use is presented. Then, the relationship between variables of gender, age and language proficiency is examined with the SRVS. And finally qualitative data are presented and discussed.

Glossing Mode

Table 4 shows the descriptive statistics as far as the first question is concerned.

Groups	N	Mean	Std. Deviation
Experimental group 2 (L1 gloss)	52	1.8750	.80623
Experimental group 3 (L2 gloss)	47	2.0000	.66667
Experimental group 1	80	3.6500	.67082
Total	172	2.5636	1.08463

Table 4. Descriptive Statistics for Self-Regulated Vocabulary Strategy Use Regarding Glossing Mode

According to the mean scores, experimental group 1 outperformed the other groups. A one-way analyses of variance (ANOVA) was conducted on self-regulated vocabulary strategy use of the three groups (see Table 5).

	Sum of Squares	df	Mean Square	F	Sig.
Between groups	37.227	2	18.614	36.803	.000
Within groups	26.300	176	.506		
Total	63.527	178			

Table 5. ANOVA Results for the Self-Regulated Vocabulary Strategy Use

The results of ANOVA revealed statistically significant differences (F=36.803, p= 0.000) in the overall use of strategies by participants. The Tukey *post-hoc* test showed that the significant difference was between the experimental group 1 (M=3.6500, 95% CI) and the other two groups in that it gave significantly higher preference ratings for the use of vocabulary strategies than the other groups. The comparisons between the experimental group 2 (M =1.8750, 95% CI) and the experimental group 3 (M=2.0000, 95% CI) were not statistically significant at p< 0.05.

Individual Differences

In order to examine which individual variables (i.e., gender, age, and proficiency level) were indeed a better predictor for the learners' use of self-regulated vocabulary strategies, multiple regression analyses were conducted. Before conducting multiple regression analyses, assumptions of independency, normality, and linearity were examined; scatter plots of residuals against predicted values were drawn to confirm that the latter three assumptions were met. In interpreting partial regression coefficients, the possibility of multicollinearity between the independent variables was a concern. However, there were relatively low values of Variance Inflation Factor (VIF), indicating that there may be no serious multicollinearity. As the correlation coefficient (R) in Table 6 indicates, there has been a strong correlation between the dependent variable and the independent variables. Also, the adjusted R square (R=0.435) shows that the 43.5 percent of the variation in the use of self-regulated vocabulary strategies can be accounted for by the linear composite of independent variables tested here. In other words, the independent variables predict approximately half of the variations in the independent variable.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	683a	.467	.435	.81513

a. Predictors: Constant, proficiency, age, gender

Table 6. Multiple Regression Analysis Results

Table 7 shows which individual variable is a good predictor of the variations in the independent variable and also shows the correlations between them.

Variable	B	SE B	ß
(Constant)	4.670	.498	
Gender	1.604	.409	.731
Age	.167	.225	.078
Proficiency	.138	.404	.064

Table 7. Results of Hierarchical Multiple Regression Analyses of Relations Between Individual Variables (independent variables) and Variables Relevant to the Use of Vocabulary Strategies (dependent variables)

As shown in Table 7, gender (p<0.05) was the strongest predictor for the use of vocabulary strategies. The two other individual variables were found to be non-influential.

The finding of a presence of gender differences overall was expected since most of the studies have shown gender difference in participants' self-regulated strategy use. Therefore, among the last three questions dealing with the individual variables, only the second one was found to mark a difference in the use of vocabulary strategies.

Qualitative Analysis Results

The analysis of the protocols focused on two aspects of the test-taking process: the processing and comprehension of each individual vocabulary item and the participants' meaning construction of the text. The verbatim protocols of the participants' think-aloud responses provided the basis for later coding and data analysis, and responses were scored and analyzed using an adaptation of Lytle's (1985) scoring system. By analyzing the test takers' verbal explanations as to why they responded as they did, following the completion of each question, the authors were able to obtain information as to the test takers' ongoing regulation of the text processing. Results indicated that the participants' self-regulation interacted with the ongoing construction of the text and the processing of the meaning of the words. The protocol analysis revealed that the glossing mode interacted with and thus developed the self-regulation in one of the following ways:

1. Rehearsing and memorizing
2. Environmental structuring
3. Keeping records and monitoring

The conclusion that can be derived from the think aloud protocol analysis is that the test takers' responses are valid reflections of the meaning they have constructed from the text.

Discussion

The results of this research shed important light on the self-regulated vocabulary strategy preferences of Persian-speaking learners of English. The findings of the study indicated that the learners' use of self-regulated strategies is much greater in computer-based environments than in paper-based environments. This finding is in line with the findings of other studies (e.g., Abraham, 2008; AbuSeileek, 2011; Farajollahi & Moenikia, 2010; Orhan, 2007). The results confirm the assumption

that computer-based learning requires autonomy on the part of the learners and thus leads to an increase in their self-regulation and management of learning. Computer-based environments might encourage the development of shared self-regulatory system which may eventually benefit learners if it permits them to best make use of their limited self-control resources over time (Fitzsimons & Finkel, 2011). Computer-based learning can also lead to the acquisition of what Ellis (1995) calls implicit and explicit learning processes. Ellis (1995) summarized several aspects of vocabulary acquisition which involve qualitatively different learning processes. He argues that the acquisition of word orthography requires implicit processes while the acquisition of word meanings requires explicit learning processes and "to the extent that vocabulary acquisition is about meaning, it is an explicit learning process" (p. 123). Therefore, according to Ellis, CALL can provide a perfect environment for the implicit acquisition of orthography and also the explicit acquisition of meanings.

The study also examined the effect of different individual variables on the use of self-regulated vocabulary strategies. The individual variables included gender, age, and level of proficiency. The results of multiple regression analyses indicated that gender was the only strong predictor of the use of strategies, with females employing more self-regulated strategies than males. Therefore, the results of this study are in contrast with the assumption that females set lower goals than males (e.g., Kurman, 2001; Strube, Lott, Le-Xuan-Hy, Oxenberg, & Deichmann, 1986).

With regard to age, young learners used similar strategies as adults. Finally, both the intermediate and advanced learners used the vocabulary strategies in similar ways.

Conclusion

As Nikolov and Mihaljević Djigunović (2011) put it:

> The state of the art of ELL is definitely a colorful tapestry. As more and more learners start learning FLs in different educational contexts and under so many varying conditions, many of the issues identified in previous studies are still on the agenda, but new ones have also surfaced… One of the obvious consequences is that the most widely applied ELT instruction methods may turn out to be less motivating and cognitively challenging after a few years. (p. 30)

This can be sensed by the appearance of new online age which is gradually replacing the traditional classrooms. The integration of technology and ELT may help learners progress, but teacher education must keep in line with the emerging needs. Thus, it is important to study how well students and teachers adapt to these new learning environments. Students have expectancies in computer-mediated classrooms, including detailed and interactive content, peer-to-peer collaborative activities, and speedy feedback (Oliver et al., 2009). Teachers can make use of some visual or dynamic content elements with the non-visual texts common in computer-mediated instruction to accommodate learner differences (Watson, 2007). However, the results of CALL studies in the developing world should be approached with care. One should note that open/distance learning (ODL) methods are already used in most countries and until online access becomes universal and common, we should be satisfied with print-based content to serve them (Baggaley, 2009). In conclusion, Lewthwaite (2001) highlights the role of new media as

follows: "New media creates both new opportunities and new restrictions not only in terms of accessibility, but also in terms of self-identity and action" (p. 32). Considering the learners' needs, the objectives of instruction, and the facilities available, educators are strongly recommended to intentionally develop students' self-regulatory skills in vocabulary learning through the use of multimedia learning environment.

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