VISUAL OR LOGICAL ENCODING: A COMPARISON BETWEEN TWO APPROACHES IN VOCABULARY LEARNING

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Abstract: *The present study aims at detecting the superiority of either visual or logical encoding over the other in terms of its effects on vocabulary learning. Participants who are assigned into two groups namely VE (Visual Encoders) and LE (Logical Encoders) receive either of treatments, i.e. visual encoding strategy or logical encoding strategy, and are tested at two intervals. The results showed that visual encoders outperformed logical encoders not only in terms of recognition but also regarding recall or production ability. It can be argued that for the purpose of vocabulary learning either as a self study or through formal education and participating in formal programs, visual representations should be provided in order to enhance learners' recognition and production abilities.*

Keywords: *Visual, logical, encoding, vocabulary, learning.*

Introduction

Vocabulary, as Zimmerman (1997) claims, is an integral part of every language and of great use to language users. Vocabulary is central to language and is of great significance to language learners. Vocabulary items are the key elements of any language; through knowing even a bunch of words, one can express himself in another language. Words are the building blocks of a language since they label objects, actions, ideas without which people cannot convey the intended meaning.

Despite the significant role of vocabulary in language learning/acquisition, the area of vocabulary learning and teaching has for most of its history been down scored or ignored. (Zimmerman, 1997) Similarly, Decarrico (2001) refers to the same fact by saying that "this area of teaching was often neglected because it was thought that vocabulary could simply be left to take care of itself."

After years of negligence, only recently scholars have been interested in investigating the area. (Coady, 1997; Zimmerman, 1997; Decarrico, 2001; Hiebert and Kamil, 2005). The reason for such sudden interest, as Decarrico (2001) puts, is the contribution of computers to research domain and new insights of psycholinguistic studies regarding such elements as memory, storage and retrieval.

Following the recent attempts for enriching the body of literature on vocabulary teaching and learning, the present study tackles two seemingly effective approaches for encoding and learning vocabulary with the purpose of identifying the best way for encoding and subsequent learning of vocabulary items. In the following section a brief explanation about the key concepts related to the topic is given. The prominent role of vocabulary knowledge has been recently recognized by theorists and researchers in the field. Accordingly, numerous types of approaches, techniques, exercises and practice have been introduced into the field to teach vocabulary (Hatch & Brown, 1995). It has been suggested that teaching vocabulary should not only consist of teaching specific words but also aim at equipping learners with strategies necessary to expand their vocabulary knowledge (Hulstjin, 1993, cited in Morin & Goebel, 2001). Vocabulary

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learning strategies are one part of language learning strategies which in turn are part of general learning strategies (Nation, 2001). Language learning strategies encourage greater overall self-direction for learners. Self-directed learners are independent learners who are capable of assuming responsibility for their own learning and gradually gaining confidence, involvement and proficiency (Oxford, 1990). So is the case with vocabulary learning strategies. Thus, students need training in vocabulary learning strategies they need most. Research has shown that many learners do use more strategies to learn vocabulary. But they are mostly inclined to use basic vocabulary learning strategies (Schmitt, 1997). This in turn makes strategy instruction an essential part of vocabulary learning.

Objective of the study

The present study intends to investigate and identify the best way for encoding and learning vocabulary items and it compares visual and logical encoding.

Research Questions

Regarding the topic of the study, two questions might challenge our minds:

1. Is there any significant difference between the recognition ability of students using visual techniques of encoding vocabulary and those who have employed logical encoding techniques?
2. Is there any significant difference between the two groups receiving either approach in terms of production ability?

Key Concepts

Visual Encoding:

Visual Encoding refers to the process by which we remember visual images.

Logical Encoding:

Logical Encoding refers to some strategies for learning. Using word stems, learning the words through synonyms and antonyms are among the logical strategies which can be used in order to commit words into memory.

Literature review

For the purpose of the study, some crucial concepts need to be discussed first, e.g. it seems essential to see how learning takes place. According to Wittrock (1980), for learning to happen, we should go through three phases. First, we should focus our attention on the material to be learned. Then, we have to comprehend it, and finally, we should encode the incoming information for storage. [as cited in Chastain, 1988] Vocabulary learning also follows the same procedure. Of course, McCarthy (1984) claims that vocabulary learning happens only when "language users use them automatically in a wide range of language contexts when the need arises." One of the most important phases of vocabulary learning is the encoding stage, since it leads to storage, i.e. how vocabulary items are stored in the long term memory. As Chastain (1988) asserts encoding process may take various forms such as visual, verbal, logical, auditory or semantic.

Depending upon whether attention and conscious processes are involved in learning or not, vocabulary learning might be either implicit or explicit, and intentional or incidental. Implicit learning as Rieder (2003) defines is a natural learning void of conscious processes. Explicit learning, however, involves consciously processing the information. (Rieder, 2003) Another set of terminology with almost the same meaning is intentional versus incidental learning. Intentional vocabulary learning as Hulstijn

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(2001) believes involves committing the words into memory deliberately. Incidental learning, on the other hand, involves "picking up of words…, simply by engaging in a variety of communicative activities, during which learners' attention was focused on the meaning rather than on the form of the language. Of course, as Ellis (1994) puts, in both intentional and incidental vocabulary learning, the factor of attention is present; the only difference is that in the former we have "focal" attention, but in the latter "peripherial" attention is used. [as cited in Coady, 1997a]

Explicit or implicit, intentional or incidental?

Many scholars have sought the question; Nagy, Herman and Anderson (1985) believe that children learn a plethora of words through incidental learning. [as cited in Coady, 1997a] Oxford and Scarcell (1994) claim that explicit strategies are essential for vocabulary learning. [as cited in Coady, 1997a] Similarly, Decarrico (2001), while appreciating incidental learning as a facilitating factor for learning, insists that explicit teaching and intentional learning are also crucial. Moreover, Mckeown and Beck (1988) believe that direct instruction is more efficient than incidental learning for vocabulary acquisition. [as cited in Smith, 1997]

Two approaches to intentional vocabulary encoding/learning are logical and visual encodings. The former is one way for encrypting vocabulary items and sending them into memory for storage. Grouping words, e.g. classifying sports into two groups of individual sports and team sports, using word stems, and learning the words through synonyms and antonyms are among the logical strategies which can be used in order to commit words into memory. According to Kleinow (2009), one of the typical strategies for learning vocabulary is using synonyms. "Synonyms are words with almost the same meaning as another word." Kleinow (2009) also claims that vocabulary can be built by the use of "synonyms, antonyms, homonyms, prefixes, suffixes, Latin and Greek roots, core vocabulary words."

Method

Participants

The participants in the present study are twenty four graduates from various disciplines of Medicine, Computer, Law and Textile industry, who voluntarily took part in the research. They were randomly assigned into two groups. Initial randomization and having the control of the pretest are the two main features of the study. The design is much similar to randomized subjects, pretest-posttest control group design except for the fact that no control group is involved; instead the subjects are assigned into two different experimental groups, each receiving a different treatment. In contrast with randomized participants, pretest-posttest control group design, the sensitizing effect is ruled out in this study since both groups receive treatment.

Materials

A laptop was used to show the visual representations of the selected words to visual encoding (VE) group; and a copy of words in addition to their synonyms was given to each of logical encoding (LE) group members. For the purpose of pre-assessment, a ten-item vocabulary recognition test and for doing the post-assessment, again a ten-item vocabulary recognition test and a ten-item vocabulary recall or production test were used.

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Procedure

The data used in this study contains ten vocabulary items taken from 1100 Words You Need to Know. The students were asked to complete ten-item vocabulary recognition pre-tests in four minutes to determine their prior knowledge of the vocabulary used in this study. In the present research the participants were only tested on the meaning of words, not pronunciation or spelling. The results of the pretest showed that none of the participants knew any of the selected words. One day subsequent to pretest, they were exposed to the selected vocabulary items in fifteen minutes and directed to encode them using either of the approaches. The members of each group were told that the encoding approach they were following was of great efficiency in order to prevent them from resorting to any other technique. VE group was shown the words with their accompanying pictures. LE group, on the other hand, encoded the new information and created logical connections using synonyms. They were asked if they knew the meaning of the synonyms; in the case they had any problem realizing the meaning of the synonyms, the Persian equivalents were offered. They were asked to guess the meaning of words in order to enhance the depth of processing and the amount of their involvement in the process of learning. Three days after the first exposure, students were given another recognition test in order to measure the effects of both encoding approaches on the recognition ability of the students. And finally, six days subsequent to the fist exposure, a vocabulary recall test was used to assess the production ability of the students. The rationale behind administering the second test is that learning a vocabulary item does not end with just its storage in the long term memory, but as it was touched upon in the previous section, a word is learned only when it can be used in future; so as an assessment tool, the recall test was administered six days after the participants had committed the words into their memory.

Result and Discussion

Recognition Test

The following table presents the t-test analysis for comparing the means of the two groups regarding their recognition test scores.

Table 1. The t-test analysis of the VE a LE groups' recognition test scores

Levene's Test for Equality of Variances		t-test for Equality of Means						
							95% Confidence Interval of the Difference	
F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
40.822	.000	3.229	22	.004	1.11032583	.34380953	.39730850	1.82334316
		3.229	13.247	.006	1.11032583	.34380953	.36897695	1.85167472

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As the degree of probability of Levene's test for equality of variances, i.e. .000 shows, the two groups are not equal in terms of variance, so the results represented in the second row are reported. Considering the amount of t index probability, i.e. .006 which is lower than .05, we can conclude that there is a significant difference between two groups as far as their recognition scores are concerned. In addition, the value of t index at 13 degrees of freedom, i.e. 3.22 which is higher than the critical value of t at the same degrees of freedom, i.e. 2.160, verifies the reported results. Therefore, it can be claimed that there is a significant difference between the two groups regarding their recognition scores.

Of course, there is a difference between statistical significance and practical importance of the results. In order to test the practicality of the results the Eta Squared formula is used.

$$\text{Eta Squared} = \frac{t2}{t2+d.f.}$$

Since the value of Eta Squared, i.e. .44 is higher than .14, we can conclude that the results are practically meaningful. However, as far as the number of subjects is limited, the results are reported cautiously.

Recall Test

The following table presents the t-test analysis for comparing the means of the two groups regarding their recall test scores.

Table 1. The t-test analysis of the VE a LE groups' recall test scores

Levene's Test for Equality of Variances		t-test for Equality of Means						
							95% Confidence Interval of the Difference	
F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
1.790	.195	3.654	22	.001	1.20331796	.32928015	.52043272	1.88620320

Since the degree of probability of F index or Levene's test, i.e. .19 is higher than .05, the two groups are equal in terms of variance and the results of the first row are reported. Considering the amount of t index probability, i.e. .01 which is lower than .05, we can conclude that there is a significant difference between two groups as far as their recall test scores are concerned. In addition, the value of t index at 22 degrees of freedom, i.e. 3.65 which is higher than the critical value of t at the same degrees of freedom, i.e. 2.074, verifies the reported results. So, we can claim that visual encoders have significantly outperformed the logical encoders. However, in order to see if the results are practically significant or not the EtaSquared is used.

$$\text{Eta Squared} = \frac{t2}{t2+d.f.}$$

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Since the value of EtaSquared, i.e. 1.18 is higher than .14, we can conclude that the results are indeed significant. However, for the small number of subjects, the results are cautiously reported.

Conclusion

As mentioned before, logical and visual encodings are two important approaches towards learning of vocabulary items. By testing the two groups on their recognition ability and comparing groups' means through running t-test analysis, we claimed that visual encoders had outperformed logical encoders in terms of recognition of vocabulary items. Taking the results into account, we can conclude that if vocabulary items are encoded using visual representations such as pictures, graphs, charts, even writing the words will enhance the recognition ability of learners.

Similarly, comparing the two groups' means on their recall or production ability shows that visual encoders recall the stored information more easily and have better production ability. As a result, we can argue that if the purpose of learning vocabulary items is not only recognition but also their recall and production in the future occasions, visual techniques for words' encoding are more efficient tools. It is important to mention that learning new vocabulary is a challenge to foreign language students but they can overcome it by having access to a variety of vocabulary learning strategies. Learners should then be trained in strategies they lack. To this end, teachers should consider the learners' willingness and readiness to receive trainings and think of the most appropriate way to introduce the strategies.

As far as the present study was conducted during a short period of time using small number of subjects, for the results to be trustworthy, it demands more research in the area using large number of participants from different age levels. In addition, more studies need to be done for comparing other visual or logical representations such as chart, graphs, diagrams, outlines, word stems, homonyms and core vocabulary words, and also other techniques for encoding, such as semantic, verbal and auditory might be compared for the purpose of finding the best way for encrypting vocabulary items and committing them into memory.

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