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An Attribute-Treatment Interaction Study:

Lexical-Set versus Semantically-Unrelated Vocabulary Instruction

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Abstract ■ The purpose of the current study was (a) to assess the effectiveness of the lexical-set (LS) and the semantically-unrelated (SU) vocabulary instruction, separately and relative to each other, and (b) to assess the differential effects of the two methods for students of lower and upper English proficiency levels. Two intact EFL classes were assigned randomly to the LS or the SU treatment. Each treatment group then received special instruction in vocabulary. The students' gains of target words were measured in terms of vocabulary breadth (VB) and vocabulary depth (VD) knowledge, using the Vocabulary Knowledge Scale (VKS). The study provided some initial evidence to suggest that although students in both instructional methods significantly gained in their knowledge of target words with regard to their VB and VD knowledge, both upper and lower level LS students reached a significantly higher level than their peer SU ones. The upper level students, however, made greater gains than their peer lower level ones.

The last 25 years or so has witnessed a continual advance of research in the area of vocabulary teaching. Vocabulary has currently stimulated the interest of investigators in the field, while it was virtually 'neglected' before 1980 (Meara 1980). One measure of this rapid rise of interest is the upsurge of some specialized vocabulary teaching textbooks in the



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years after 1980 (e.g., McCarthy and O'Dell 1994; Redman 1997; Rudzka, Channell, Ostyn, and Putseys 1981, 1985; Seal 1987, 1988; Thomas 1986, 1989). A second measure is the development, during the same period, of a number of research articles and books dedicated to the area of vocabulary teaching and to the utilization of various vocabulary-teaching techniques (e.g., Allen 1983; Carter and McCarthy 1988; Coady and Hukin 1997; Gairns and Redman 1986; Nation 1990, 2001; Morgan and Rivolucrici 1986; Schmitt and McCarthy 1997).

Disappointingly, however, many second language teachers assume that students can manage to pick up substantial new words incidentally and on their own, through reading or other related activities (Zimmerman 1997). However, this assumption is not supported empirically. Research has demonstrated that the process of incidental word learning is slow and one cannot have control over the words that are being learned and the degree to which the words are known (Paribakht and Wesche 1997).

This urges us to devise a systematic framework through which to present words to learners. Drawing on psychological investigations on our mental lexicon and linguistic research into the organization of lexis as well as recent developments in vocabulary teaching, this study attempts to provide some evidence on the usefulness of two methods for teaching vocabulary—the 'lexical-set' (LS) and the 'semantically-unrelated' (SU) methods.

In both these methods, vocabulary items are embedded in short contexts so as to activate appropriate semantic structures. Students are also presented with the definitions of words. This urges students to take into account the word meaning—a process called 'semantic encoding' (cf. Lefrancois 1991: 65), and thus make an initial link between the target form and its meaning.

However, only in the LS method do students receive words in 'lexical sets'. A lexical set includes words related in meaning or words belonging to the same 'semantic domain' or 'lexical field' (cf. Cruse 1986; Leech 1974; Lehrer 1974; Lyons 1977). For instance, words connected to the notion of '*ways of looking*' are presented together: '*stare, gaze, glare, glance, glimpse, blink, wink, peer, peep*'.

In addition, words are presented under particular topics. The topic can serve as an 'advance organizer' (Ausubel 1968), which is supposed to establish a 'stable cognitive structure', and to help the learner visualize a general concept, under which to 'subsume' the target words (cf. Lefrancois 1991: 96). This is believed to make the word-learning task easier,

since learners are more likely to learn a word for which they have formed a concept before exposure (Brown 1993; Scarcella and Zimmerman 1998).

The theoretical support for the LS vocabulary instruction comes, in part, from Ausubel's (1963) expository teaching. Ausubel maintains that teachers should present learners with pre-organized material, so that it may be immediately meaningful for them. He urges that this type of learning is not passive, nor does it stifle creativity or encourage rote learning. It involves relating new material to existing cognitive structure (cf. Lefrancois 1991: 90-105).

Using the LS method, therefore, the teacher can help students 'organize' or 'chunk' words into sets of related meanings, 'subsume' them under appropriate topics, as well as form associations between the new word and the words already known—a cognitive process called 'elaboration' (cf. Lefrancois 1991: 67). It might be claimed, therefore, that it would be more likely that words are processed at a deeper cognitive level in the LS method than in the SU, in which words are presented sporadically, irrespective of other semantically-related items. So in line with the 'levels-of-processing theory' (Craik and Lockhart 1972) and its expanded version (Craik and Tulving 1975), the LS students would probably improve their vocabulary knowledge to a greater extent than the SU ones.

Another rationale for presenting items in lexical sets comes from L1 vocabulary acquisition studies. Clark (1993) notes that once children begin to acquire a lexical domain, they are more likely to learn several words of the same domain simultaneously. It might be hypothesized that L2 learners beginning to expand a lexical domain will be more prepared to pick up several members of the same domain at the same time.

Some theoretical bases for the LS vocabulary instruction can be found in the concepts of 'semantic field theory' in linguistics, and 'semantic activation theory' and 'associative priming' in cognitive psychology. According to the 'semantic field theory', the vocabulary of a language can be organized into sets, which are related to particular semantic domains (Cruse 1986; Leech 1974; Lehrer 1974; Lyons 1977). According to 'the semantic activation theory', words are processed in memory through mental structures called nodes (Collins and Loftus 1975; Neely 1977). If a node is activated, activation spreads through interconnected links to associated concepts, making them more available for further cognitive processing (Balota and Lorch 1986). Thus, if words in our mental lexicon are related in associative networks (Aitchison 1987), then presenting items in lexical sets might facilitate the word-learning process.

This idea also accords with the concept of ‘associative priming’, according to which if associated items are presented simultaneously, the process of gaining access to information is facilitated (Anderson 1995). Therefore, the word ‘*nurse*’ would be recognized faster when presented with a related word such as ‘*doctor*’ than when presented with an unrelated word such as ‘*butter*’.

All the above-mentioned theories and studies fortify the potential usefulness of the LS vocabulary instruction. On the contrary, the ‘interference theory’ provides some evidence against the LS vocabulary instruction. According to this theory, ‘when words are being learned at the same time but are too ‘similar’ or share too many common elements, then these words will interfere with each other, impairing retention of them’ (cited in Waring 1997: 261-62). In line with this theory, then, less vocabulary gain is expected in case vocabulary is processed through the LS method.

What has been discussed so far is a theory-based comparison between the LS and SU vocabulary instruction, which can indicate the significance of an empirical investigation into the problem. The previous studies, however, have been concentrating mostly on the use of overt association devices such as semantic grids in teaching vocabulary (e.g., Mansouri 1985). In the current study the LS and SU methods of vocabulary instruction are being empirically studied and compared with each other.

The study reported here is an ‘attribute-treatment interaction’ one (cf. Cronbach and Snow 1977). It is assumed that a particular method of vocabulary teaching might not be effective, to the same extent, for learners with different characteristics. For two reasons, the learner’s English proficiency level is regarded as the independent variable that might interact with the other independent variable, that is, treatment group. First, it was hypothesized that the learner’s English proficiency level affects word learning. Research has demonstrated that the recall of words in context is positively related to the proficiency level of learners (Cohen and Apeh 1980). Furthermore, L1 vocabulary acquisition studies show that vocabulary growth in children is not linear. In the initial stages of child language development, word acquisition is rather slow. Once the child has gained a vocabulary of about 100 words and has, thus, become more proficient in the language, rapid word learning or the ‘vocabulary spurt’ begins (Schafer and Plunkett 1998). Second, it is hypothesized that one method of vocabulary instruction may be more beneficial to learners of one proficiency level than to learners of the other, for learners of varying proficiency levels might employ different strategies in learning new words. For exam-

ple, Henning (1973) shows that foreign language learners of varying proficiency levels use different techniques to store words in the memory.

This study adopts an instrument called 'The Vocabulary Knowledge Scale (VKS)' (Wesche and Paribakht 1996) to measure the students' gains of target words. A distinctive feature of this measurement is that it makes a distinction between how many words are known, termed 'vocabulary breadth' (VB) and how well individual words are known, termed 'vocabulary depth' (VD).¹

The purpose of the study was twofold: (a) to assess the effectiveness of the LS and SU vocabulary instruction, described above, separately and relative to each other, and (b) to assess the differential effects of the two instructional methods for students of lower and upper English proficiency levels. Hence, the following null and sub-null hypotheses were formed: (Each null hypothesis will be considered with respect to (a) the VD and (b) the VB measure.)

H_0^1 : Students will not gain in their knowledge of target words through the LS method.

H_0^{1-1} : There will be no significant difference between the upper and lower level LS students in their gains of target words.

H_0^2 : Students will not gain in their knowledge of target words through the SU method.

H_0^{2-1} : There will be no significant difference between the upper and lower level SU students in their gains of target words.

H_0^3 : There will be no significant difference between the LS and SU students in their gains of target words.

H_0^{3-1} : The difference in target vocabulary gains of the LS and SU students is not affected by students' proficiency level.

Method

Participants

The participants were 60 EFL students from two intact intermediate classes at an English institute in Mashhad, Iran. Each class was made up of 30 students, consisting of a balanced ratio of males and females, ranging from 20 to 30 in age. They had studied English for at least six years in high schools and were studying the intermediate course-book *Streamline*:

Connections (Hartley and Viney 1984). The English proficiency level of the two classes, as identified by their Nelson Proficiency Test (NPT) scores, was found to be roughly equal.

Design

The design used was a quasi-experimental one, called a ‘non-equivalent control-group design’ (Borg and Gall 1989: 690). This design was chosen on two grounds: First, the administration of a pretest seemed necessary so as to account for preexisting differences between groups and thus to maximize the internal validity of the research. Second, in order to maximize the ecological validity of the research findings and make the results applicable to the dynamic classroom, real classroom situations were used² (cf. Borg and Gall 1989: 655).

Instructional Materials

One hundred words and expressions from 13 different lexical sets were chosen for instruction in this study.³ The vocabulary items were incorporated into short sentential contexts, so that the students could see not only what the words meant but also how they were used.

The two treatment groups were taught the same vocabulary items in identical contexts. However, whereas the LS group received the words in lexical sets under particular topics, the SU group received them sporadically, isolated from other members of the same lexical set.

Instrumentation

The testing materials consisted of (a) a Nelson Proficiency Test, the purpose of which was to place the students at the right proficiency levels, and (b) a Vocabulary Knowledge Scale, containing 100 vocabulary items, whose purpose was to measure the students’ breadth and depth of knowledge of target words. Having received the 100-item vocabulary test, the students were required to indicate their level of knowledge for each word on a five-point scale according to how well they knew the word (see Figure 1a). As for the scoring procedure, categories I and II led to scores 1 and 2, respectively, and categories III through V led to scores 2 through 5 according to how well the students had demonstrated their knowledge (see Figure 1b).

Hence, the sum of each student’s scores for all the words on the test was the measure of the students’ qualitative knowledge of those words or VD. To measure the students’ quantitative knowledge of target words or

VB, scores 3, 4, and 5 were given one point each; scores 1 and 2 were given no point.

<i>Self-Report Categories</i>	<i>Meaning of Scores</i>
I	I don't remember having seen this word before.
II	I have seen this word before, but I don't know what it means.
III	I have seen this word before, and I <i>think</i> it means -----: (synonym or translation).
IV	I <i>know</i> this word. It means ----- (synonym or translation).
V	I can use this word in a sentence: ----- (Write a sentence. If you do this section, please also do section IV.)

Figure 1a. *VKS Elicitation Scale—Self-Report Categories*

<i>Self-Report Categories</i>	<i>Possible Scores</i>	<i>Meaning of Scores</i>
I →	1	The word is not familiar at all.
II →	2	The word is familiar, but its meaning is not known.
III →	3	A correct synonym or translation is given.
IV →	4	The word is used with semantic appropriateness in a sentence.
V →	5	The word is used with semantic appropriateness and grammatical accuracy in a sentence.

Figure 1b. *VKS Scoring Categories—Meaning of Scores*
(Adapted from Wesche and Paribakht 1996: 30)

The reliability for the VB measure⁴ was estimated to be 0.57 for the pretest, showing that the internal consistency of the test was moderate before instruction, most probably because the items were not of equal

difficulty for each learner. However, the reliability for the posttest was raised to 0.94. Such a high reliability could be due to the fact that the items might have become more homogeneous for the learners after instruction. Correlation analyses on the NPT and the VD/VB measure rendered the following results. The correlation coefficients between the NPT and the VD/VB measure were 0.71 and 0.64, respectively for the pretest and 0.77 and 0.71, respectively for the posttest, indicating that the VD and VB tests might be taken as moderately valid predictors of language proficiency. The correlation coefficients between VB and VD measures were found to be 0.69 and 0.93 for the pretest and posttest, respectively, indicating the existence of a relationship between these measures.

Procedure

Each intact class was randomly assigned to either the LS or the SU treatment group.⁵ Both treatment groups took the 100-item VKS as the pretest in a two-hour session a week before the instructional phase of the experiment. Next, the NPT was administered to the two classes in a 45-minute session, on the basis of which four roughly homogeneous groups of subjects were formed: 'upper LS, lower LS, upper SU, and lower SU', each consisting of 15 subjects (see the results section).

The methods of instruction were different for the LS and SU treatment groups. For each group, four 45-minute sessions were held to teach the 100 vocabulary items. Each class was held twice a week, with a three- or four-day interval between the sessions. Before each lexical set was presented, the LS classes were provided with a topic, followed by vocabulary items belonging to the lexical set used in sentence context. After the teacher read each sentence, the students were supposed to repeat the new word and try to guess its meaning, using sentential clues, the topic, and other members of the same lexical set.

Some of the students volunteered to present their guesses to the class. Whether or not they had guessed the meaning correctly, they were provided with the definition of the word, paraphrased from English dictionary entries. Where necessary, a Persian translation of the word was provided as additional help. Students in the SU method went through the same procedure; however, measures were taken to avoid presenting vocabulary items of the same lexical set at once. Rather, they were taught sporadically, irrespective of other members of the set. Naturally, therefore, they could not guess the meanings as easily as the students in the LS

method; and in most cases they failed and received the definitions from the teacher.

A week after the instruction ended, the participants took the same 100-item VKS as the posttest, the aim of which was to measure their knowledge of target words after the instruction. Finally, the data for this study was analyzed using 'analysis of variance'. The level of significance for all data analyses was set at 0.05.

Results

Pre-experimental Measures

The classes were compared on the basis of their NPT scores as well as their VD and VB pretest scores. The 2×2 (Treatment Group \times Proficiency Level) ANOVA on the NPT scores showed no significant difference between treatment groups, $F(1,56) = 0.0023$, $p = 0.96$, suggesting that the two treatment groups were of roughly equal proficiency level. However, a significant difference was found between the below- and above-median scores, $F(1,56) = 139.6419$, $p = 0.000$, verifying the claim that the subjects could be divided into two proficiency levels.

The ANOVA on VD pretest scores indicated no significant difference between the two treatment groups, $F = 0.75$, $p = 0.78$, neither did the ANOVA on VB, $F = 0.015$, $p = 0.90$. However, the upper level students outperformed the lower level students in their VD, $F = 34.440$, $p = 0.000$, and VB pretests, $F = 20.503$, $p = 0.000$. The result can also be an indication that VD and VB measures have concurrent validity⁶ since they have discriminated among groups of individuals at different levels of language ability (cf. Bachman 1990: 248).

Experimental Measures

The hypotheses and sub-hypotheses are as presented earlier. For each hypothesis and sub-hypothesis, the findings pertinent to (a) the VD and (b) the VB measure are reported:

H_0^1 : Students will not gain in their knowledge of target words through the LS method.

H_0^{1-1} : There will be no significant difference between the upper and lower level LS students in their gains of target words.

A 2×2 (Time of Testing \times Proficiency Level) ANOVA was run on the VD/VB pre- and post-instruction scores of the LS group. The ANOVA on

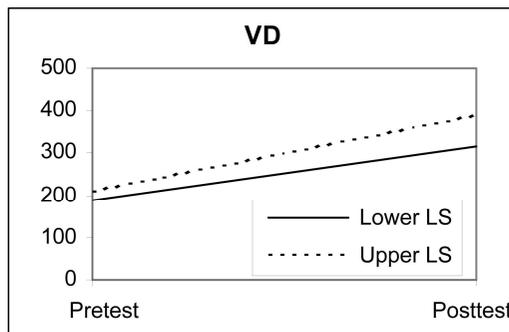
the VD scores yielded a significant effect for time of testing, $F(1,56) = 358.51, p = 0.000$, and so did the ANOVA on the VB, $F(1,56) = 523.178, p = 0.000$. The results indicate that students gain in their VD and VB knowledge through the LS method. This allows us to reject H_0^1 .

The ANOVA on the VD scores yielded a significant time of testing \times proficiency level interaction effect, $F(1,56) = 10.22, p = 0.000$, and so did the ANOVA on the VB, $F(1,56) = 13.87, p = 0.000$ (see Table 1 for descriptive statistics). As also depicted in Figure 2, these statistically significant F ratios indicate that the upper level LS students have achieved significantly greater gains in their VD and VB knowledge than the lower level ones. This finding allows us to reject H_0^{1-1} .

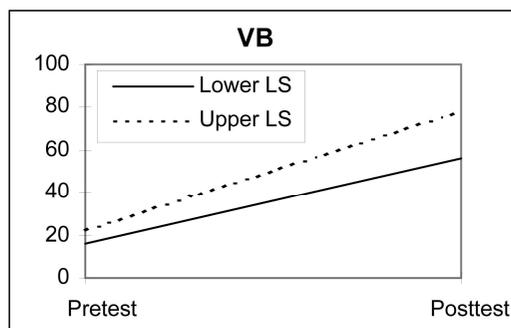
Table 1. Descriptive Statistics for the Lower and Upper Level Students of the LS Group on VD and VB Measures.

	VD				VB			
	Pretest		Posttest		Pretest		Posttest	
	M	SD	M	SD	M	SD	M	SD
Lower	189.40	16.29	314.73	34.48	15.80	4.39	56.06	10.28
Upper	213.40	16.03	389.67	45.76	22.26	5.11	78.20	10.67
Total	201.40	20.03	352.20	55.11	19.03	5.72	67.13	15.25

Note: VD = vocabulary depth, VB = vocabulary breadth, M = mean, SD = standard deviation



(a)



(b)

Figure 2. Plots of Two-way Interactions Involving Time of Testing and Proficiency Level for (a) VD and (b) VB Mean Scores of the LS Group

H_0^2 : Students will not gain in their knowledge of target words through the SU method.

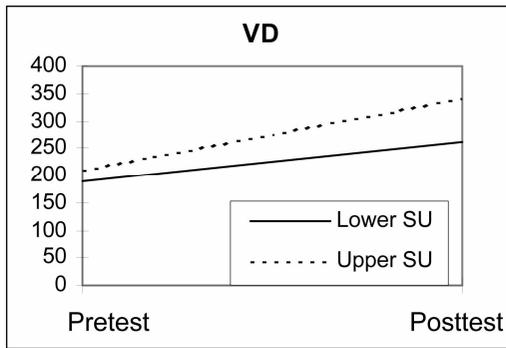
H_0^{2-1} : There will be no significant difference between the upper and lower level SU students in their gains of target words.

A Time of Testing \times Proficiency Level analysis of variance was conducted on the VD/VB pre- and post-instruction scores of the SU group. The F ratio was found to be statistically significant for the main effect of time of testing on the VD measure, $F(1,56) = 205.50$, $p = 0.000$, as well as on the VB, $F(1,56) = 114.24$, $p = 0.000$. The results indicate that students gain in their VD and VB knowledge through the SU method. Thus, based on the results, H_0^2 can also be rejected.

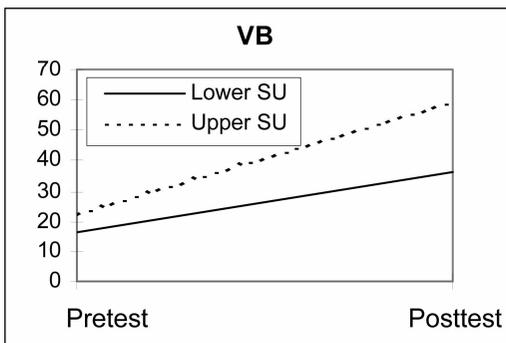
The time of testing \times proficiency level interaction was found to be significant for the VD scores, $F(1,56) = 16.12$, $p = 0.000$, as well as for the VB scores, $F(1,56) = 10.14$, $p = 0.002$ (see Table 2 for the descriptive statistics). As also depicted in Figure 3, these statistically significant F ratios show that the upper level SU students have achieved significantly greater gains in their VD and VB knowledge than the lower level ones. The findings allow us to reject H_0^{2-1} .

Table 2. Descriptive Statistics for the Lower and Upper Level Students of the SU Group on VD and VB Measures.

	VD				VB			
	Pretest		Posttest		Pretest		Posttest	
	M	SD	M	SD	M	SD	M	SD
Lower	188.73	12.95	261.47	23.56	16.26	5.84	36.60	9.73
Upper	211.87	16.65	341.20	44.49	22.13	5.61	59.73	16.73
Total	200.30	18.79	301.33	53.55	19.20	6.73	48.16	17.87



(a)



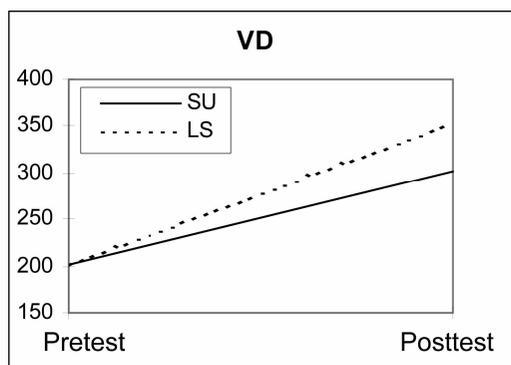
(b)

Figure 3. Plots of Two-way Interactions Involving Time of Testing and Proficiency Level for (a) VD and (b) VB Mean Scores of the SU Group

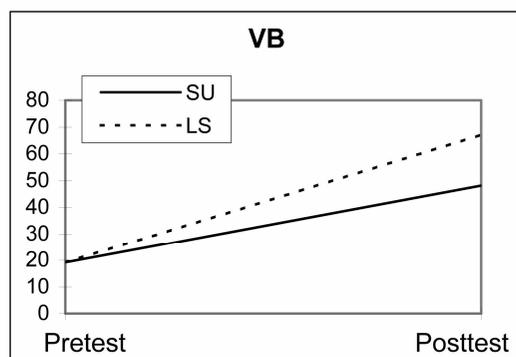
H_0^3 : There will be no significant difference between the LS and SU students in their gains of target words.

H_0^{3-1} : The difference in target vocabulary gains of the LS and SU students is not affected by students' proficiency level.

A 2×2 (Proficiency Level \times Treatment Group) ANOVA was performed on both VD and VB gain scores. The F ratio for the main effect of treatment group was found to be significant for the VD gain scores, $F(1,56) = 27.55, p = 0.000$, as well as for the VB, $F(1,56) = 44.06, p = 0.000$. As also depicted in Figure 4, the LS students have earned significantly greater gains in their VD and VB knowledge than the SU ones (also, compare Figures 5 and 6). This allows us to reject H_0^3 .



(a)



(b)

Figure 4. Plots of Mean Pre- and Post-instruction Scores of LS and SU Groups for (a) VD and (b) VB Scores

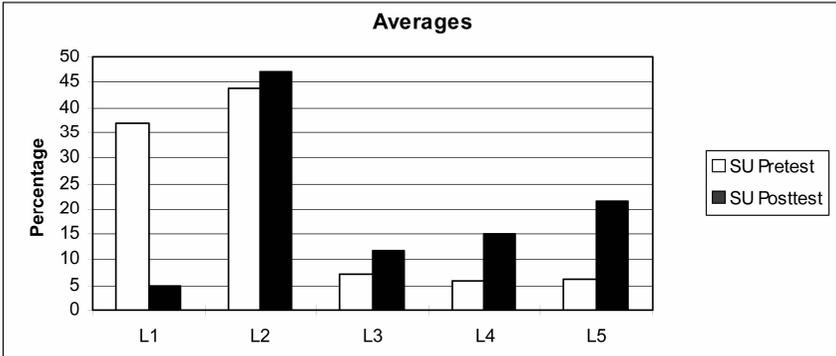
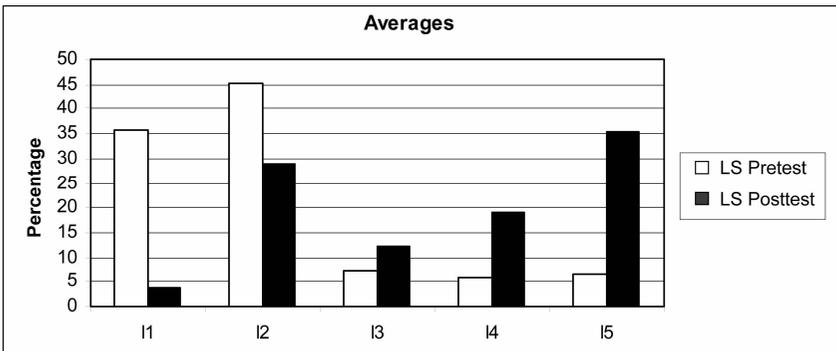


Figure 5. Score Variations across Levels of Word Knowledge for the LS Group



Note: L = Level

Figure 6. Score Variations across Levels of Word Knowledge for the SU Group

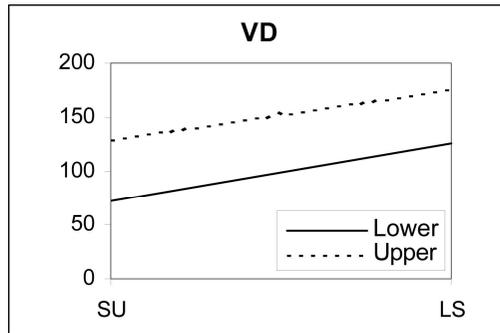
However, the ANOVA on VD gain scores did not yield a significant F ratio for proficiency level \times treatment group interaction, $F(1,56) = 0.089$, $p = 0.76$, and neither did the ANOVA on VB, $F(1,56) = 0.077$, $p = 0.78$ (see Table 3 for descriptive statistics). As also illustrated in Figure 7, the results indicate that the difference in VD/VB gains of the LS and SU groups is statistically equal⁷ for the lower and upper level students. In other words, the significant main effect for treatment group is not affected by students' proficiency level. The result supports H_0^{3-1} .

To summarize, it can be said that the LS and SU students of varying proficiency levels had significant gains in their VD and VB knowledge.

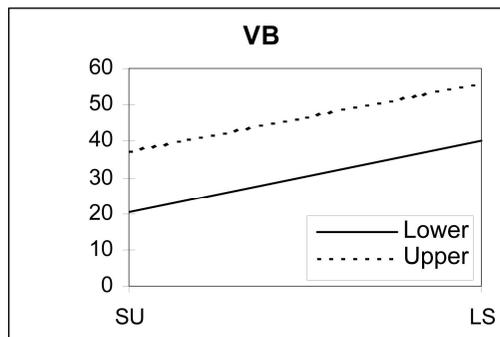
Yet, the LS students reached a significantly higher level than the SU ones, and the upper level students consistently showed greater gains than their peer lower level ones.

Table 3. *Descriptive Statistics for the Lower and Upper Level Students of the LS and SU Groups on VD and VB Gain Scores*

	VD				VB			
	LS		SU		LS		SU	
	M	SD	M	SD	M	SD	M	SD
Lower	125.33	38.20	72.73	16.00	40.26	10.79	20.33	7.95
Upper	176.26	45.17	129.33	40.44	55.93	10.42	37.60	14.49
Total	150.80	48.58	101.93	41.73	48.10	13.12	28.96	14.45



(a)



(b)

Figure 7. *Plots of Mean Gain Scores Involving Proficiency Level and Treatment Group for (a) VD and (b) VB Gain Scores*

Discussion

The results indicate that both the LS and SU vocabulary instruction led to significant gains in both the VD and VB knowledge. This finding suggests that vocabulary learning can be enhanced using some conceptual framework in which words are embedded in meaningful contexts.

However, the upper level students achieved greater gains in their VD and VB knowledge than their peer lower level ones. This finding is also similar to Cohen and Apek's (1980) experiment, which showed that the recall of words in context was positively related to the proficiency level of learners. This finding is corroborated in a way by Liu and Nation (1985), who suggested that the higher the percentage of known words in a text, the easier it would be for the learner to construe the unknown words. The results can also lead us to conclude that in case of L2 vocabulary learning, there may be a period like the L1 'vocabulary spurt' (Schafer and Plunkett 1998), when words are learned more rapidly, and that probably begins after the L2 learner has built up an initial vocabulary and has reached a higher language proficiency. Yet another possible interpretation of the result is that the materials used in this study might have been more suitable for the upper level students than for the lower level ones.⁸ If this is the case, it is suggested that teachers take care to provide students with materials suitable for their level; that is, as is implied from Liu and Nation's (1985) experiment, the proportion of unknown to known words should be controlled, so that the learner is able to interpret the unknown words more easily.

The results also indicate that the LS students achieved greater gains in their VD and VB knowledge than the SU ones. The findings allow us to conclude that presenting words in lexical sets under appropriate topics—serving as 'advance organizers' (Ausubel 1968)—might facilitate the process of word learning. The results can also justify the claim that Clark's (1993) study of L1 vocabulary learning may be applicable to L2 situations. Thus, like children acquiring their first language, L2 learners beginning to build up a lexical set may be more prepared to learn several words of the same set simultaneously than to learn them sporadically.

The findings are also in line with the view that vocabulary teaching should adapt insights from the 'semantic field theory' (Lehrer 1974) and therefore make associations between semantically-related words (Channell 1981, 1988; Crow and Quigley 1985). They also accord with the concepts

of ‘spreading activation model’ (Balota and Lorch 1986) and ‘associative priming’ (Anderson 1995) in cognitive psychology. In addition, the greater vocabulary gains of the LS students might be attributed to the fact that such learning allows for deeper cognitive processing. This finding is consistent with the ‘levels-of-processing theory’ (Craik and Lockhart 1972) and its expanded version (Craik and Tulving 1975).

However, the results of this study are not in line with the ‘interference theory’ (cf. Baddeley 1990) and challenge the conclusions from Tinkham’s (1993, 1997) and Waring’s (1997) experiments, according to which it would be better not to present words which are semantically linked at the same time. Yet, further research is needed to elucidate this inconsistency.

Pedagogical Implications

On the basis of the findings of this study, the following seem to be the main classroom implications. First, teachers should provide students with opportunities to study vocabulary systematically and in meaningful contexts. This way, they can increase both the number of words they know and their knowledge of how and when words may be used. Still a more effective way of learning new vocabulary would be to arrange them into words of similar meanings and study them under appropriate topics. Second, since different students have different strategies for learning new words, a particular vocabulary teaching method might be more beneficial to a particular group of learners. So teachers should try to explore these differences and adapt teaching techniques that are appropriate for their students. Finally, it is the teacher’s and material developer’s task to utilize vocabulary materials that match the students’ proficiency level. Materials that are not suitable⁹ for the level of the students might not contribute as highly to the students’ vocabulary growth.

Conclusion

Drawing on relevant studies and theories in linguistics and cognitive psychology, this study provided some justifications for the potential usefulness of the LS and SU vocabulary instruction. Yet, as predicted by several studies and theories (e.g., levels-of-processing, associative priming), the LS method proved to be the more beneficial one, thus demonstrating the usefulness of topics as advance organizers and organizing or chunking

words into related classes for word instruction. This study also provided some evidence on the applicability of the concept of vocabulary spurt to L2 vocabulary learning situations. However, the results of the present study were not consistent with the predictions made by the interference theory.

All in all, a quasi-experimental study of this kind can by no means be perfect. Hopefully, future research may illuminate this problem.

REFERENCES

- Aitchison, J.
1987 *Words in the Mind: An Introduction to the Mental Lexicon* (Oxford: Basil Blackwell).
- Allen, V.F.
1983 *Techniques in Teaching Vocabulary* (London: Oxford University Press).
- Anderson, J.R.
1995 *Cognitive Psychology and its Implications* (New York: W.H. Freeman, 4th edn).
- Ausubel, D.P.
1963 *The Psychology of Meaningful Verbal Learning* (New York: Grune and Stratton).
1968 *Educational Psychology: A Cognitive View* (New York: Holt, Rinehart and Winston).
- Bachman, L.
1990 *Fundamental Considerations in Language Testing* (Oxford: Oxford University Press).
- Baddeley, A.
1990 *Human Memory* (Hillsdale, NJ: Lawrence Erlbaum).
- Balota, D.A., and R.F. Lorch
1986 'Depth of Automatic Spreading Activation: Mediated Priming Effects in Pronunciation but Not in Lexical Decision', *Journal of Experimental Psychology: Learning, Memory, and Cognition* 12: 336-45.
- Borg, W.R., and M.D. Gall
1989 *Educational Research: An Introduction* (New York: Longman, 5th edn).
- Brown, C.
1993 'Factors Affecting the Acquisition of Vocabulary: Frequency and Saliency of Words', in T. Huckin, M. Haynes and J. Coady (eds.), *Second Language Reading and Vocabulary Learning* (Norwood, NJ: Ablex): pp. 263-86.
- Carter, R., and M. McCarthy (eds.)
1988 *Vocabulary and Language Teaching* (London: Longman).
- Channell, J.
1981 'Applying Semantic Theory to Vocabulary Teaching', *English Language Teaching Journal* 35: 115-22.
1988 'Psycholinguistic Considerations in the Study of L2 Vocabulary Acquisition', in Carter and McCarthy (eds.), *Vocabulary and Language Teaching*, pp. 83-96.

- Clark, E.
1993 *The Lexicon in Acquisition* (Cambridge: Cambridge University Press).
- Coady, J., and T. Hukin (eds.)
1997 *Second Language Vocabulary Acquisition* (Cambridge: Cambridge University Press).
- Cohen, A.D., and E. Aphek
1980 'Retention of Second Language Vocabulary over Time: Investigation of the Role of Mnemonic Association', *System* 8: 221-36.
- Collins, A.M., and E.F. Loftus
1975 'A Spreading Activation Theory of Semantic Processing', *Psychological Review* 82: 407-428.
- Craik, F.I.M., and R.S. Lockhart
1972 'Levels of Processing: A Framework for Memory Research', *Journal of Verbal Learning and Verbal Behavior* 11: 671-84.
- Craik, F.I.M., and E. Tulving
1975 'Depth of Processing and the Retention of Words in Episodic Memory', *Journal of Experimental Psychology* 104: 268-94.
- Cronbach, L.J., and R.E. Snow
1977 *Aptitude and Instructional Methods* (New York: Irvington).
- Crow, J.T., and J.R. Quigley
1985 'A Semantic Field Approach to Passive Vocabulary Acquisition for Reading Comprehension', *TESOL Quarterly* 19: 497-513.
- Cruse, D.A.
1986 *Lexical Semantics* (Cambridge: Cambridge University Press).
- Gairns, R., and S. Redman
1986 *Working with Words: A Guide to Teaching and Learning Vocabulary* (Cambridge: Cambridge University Press).
- Hartley, B., and P. Viney
1984. *Streamline: Connections* (Oxford: Oxford University Press).
- Hatch, E., and H. Farhady
1982 *Research Design and Statistics for Applied Linguistics* (Rowley, MA: Newbury House).
- Henning, G.
1973 'Remembering Foreign Language Vocabulary: Acoustic and Semantic Parameters', *Language Learning* 23: 185-96.
- Leech, G.
1974 *Semantics* (Harmondsworth: Penguin Books, 2nd edn).
- Lefrancois, G.R.
1991 *Psychology for Teaching* (Belmont, CA: Wadsworth, 7th edn).
- Lehrer, A.
1974 *Semantic Fields and Lexical Structure* (Amsterdam: North Holland).
- Liu, N., and I.S.P. Nation
1985 'Factors Affecting Guessing Vocabulary in Context', *RELC Journal* 16: 33-42.
- Lyons, J.
1977 *Semantics* (2 vols.; Cambridge: Cambridge University Press).

- Mansouri, A.N.H.
1985 'Semantic Field Theory and the Teaching of English Vocabulary, with Special Reference to Iraqi Secondary Schools' (Unpublished doctoral dissertation, University of Sheffield).
- McCarthy, M., and F. O'Dell
1994 *English Vocabulary in Use* (Cambridge: Cambridge University Press).
- Meara, P.
1980 'Vocabulary Acquisition: A Neglected Aspect of Language Learning', *Language Teaching and Linguistics: Abstracts* 13: 221-46.
- Morgan, J., and M. Rinvolucri
1986 *Vocabulary* (Oxford: Oxford University Press).
- Nation, I.S.P.
1990 *Teaching and Learning Vocabulary* (New York: Newbury House).
2001 *Learning Vocabulary in Another Language* (Cambridge: Cambridge University Press).
- Neely, J.H.
1977 'Semantic Priming and Retrieval from Lexical Memory: The Roles of Inhibitionless Spreading Activation and Limited-Capacity Attention', *Journal of Experimental Psychology: General* 106: 226-54.
- Paribakht, T.S., and M. Weche
1997 'Vocabulary Enhancement Activities and Reading for Meaning in Second Language Development', in J. Coady and T. Huckin (eds.), *Second Language Vocabulary Acquisition: A Rationale for Pedagogy* (Cambridge: Cambridge University Press):174-200.
- Qian, D.D.
1999 'Assessing the Roles of Depth and Breadth of Vocabulary Knowledge in Reading Comprehension', *The Canadian Modern Language Review* 56: 282-07.
- Redman, S.
1997 *English Vocabulary in Use: Pre-intermediate and Intermediate* (Cambridge: Cambridge University Press).
- Rudzka, B., J. Channel, P. Ostin and Y. Putseys
1981 *The Words You Need* (London: Macmillan).
1985 *More Words You Need* (London: Macmillan).
- Scarcella, R., and C. Zimmerman
1998 'Academic Words and Gender', *Studies in Second Language Acquisition* 20: 27-49.
- Schafer, G., and K. Plunkett
1998 'Rapid Word Learning by Fifteen-Month-Olds under Tightly Controlled Conditions', *Child Development* 62: 309-20.
- Schmitt, N., and M. McCarthy (eds.)
1997 *Vocabulary: Description, Acquisition and Pedagogy* (Cambridge: Cambridge University Press).
- Seal, B.
1987 *Vocabulary Builder*, 1 (London: Longman).
1988. *Vocabulary Builder*, 2 (London: Longman).

- Thomas, B.J.
 1986 *Intermediate Vocabulary* (London: Edward Arnold).
 1989 *Advanced Vocabulary and Idiom* (London: Edward Arnold).
- Tinkham, T.
 1993 'The Effect of Semantic Clustering on the Learning of Second Language Vocabulary', *System* 21: 371-80.
 1997 'The Effects of Semantic and Thematic Clustering on the Learning of Second Language Vocabulary', *Second Language Research* 13: 138-63.
- Waring, R.
 1997 'The Negative Effects of Learning Words in Semantic Sets: A Replication', *System* 25: 261-74.
- Wesche, M., and T.S. Paribakht
 1996 'Assessing Second Language Vocabulary Knowledge: Depth versus Breadth', *The Canadian Modern Language Review* 53: 13-40.
- Zimmerman, C.B.
 1997 'Do Reading and Interactive Vocabulary Instruction Make a Difference? An Empirical Study', *TESOL Quarterly* 31: 121-40.

NOTES

1. The VB and VD tests used in this study are different in format from vocabulary size (VS) and depth-of-vocabulary-knowledge tests (DVK), as used by Qian (1999).
2. Both methods were implemented by one of the researchers.
3. Most of the materials were taken from McCarthy and O'Dell (1994) and Thomas (1986) with minor adaptations.
4. The reliability for the VB measure was estimated using Kuder-Richardson formula 21 (Hatch and Farhady 1982): 248.
5. By this, it is meant that each intact class was assigned by chance to either the LS or the SU group; that is, each class had an equal chance (50%) to be the LS or SU group (cf. Borg and Gall 1989: 664-70).
6. According to Bachman (1990: 248), one form the information on concurrent validity can take is examining the differences in test performance among groups of individuals at different levels of language ability.
7. This means that there is some difference, but the difference is not substantial enough and thus statistically negligible. Hence, there is no interaction between proficiency level and treatment group.
8. It might be said that the materials have been biased towards the upper level students.
9. By 'suitable', it is meant materials in which the proportion of unknown to known words is controlled.