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Knowing the function of the word in the sentence helps the students guess its meaning. Even if this knowledge does not provide them with any illuminating clues, they still have an advantage in that they know which words to look up in the dictionary. "Word families" require special and constant attention. Once the students begin to relate noun and adjective forms to similar verb forms which they already know and vice-versa, they have gained a valuable asset in learning words using their own clues rather than always searching for solid support.

The teachers of English should be familiar with the basic concepts in word-formation along with its grammatical features in order to teach the students new vocabulary items with respect to their functions and productivity in sentences.

Consequently, in advanced classes, the main purpose is to help students become independent and responsible for their own learning. If learning is to be continued beyond the end of the course, the students will have to depend on their own efforts and habits of studying. Knowing word-formation rules can primarily be helpful to the teachers of EAP textbooks and as a consequence to the students in learning the vocabulary of their EAP textbooks.

Since the present study was designed to examine the significant role of the word-formation rules in learning vocabulary from EAP texts by the students of

sciences, the suggestion is that there should also be another research to investigate the role of the word-formation rules in EAP texts in other fields of study (e.g., medicine, engineering, humanities, etc.). It is needless to say that such studies needs a great number of students in EAP classes in different fields of study along with a group of expert teachers, each specialized in teaching that specific field of study.

Regarding the results obtained in this study and the related literature including theoretical assumptions and concepts in advocating the significant role of word-formation rules in teaching and learning vocabulary, it is recommended that the teachers of both EAP classes and general English classes take the effective role of the word-formation rules in teaching vocabulary into serious consideration. The teachers of English should be familiar with the basic concepts in word-formation along with its grammatical features in order to teach the students new vocabulary items with respect to their functions and productivity in sentences.

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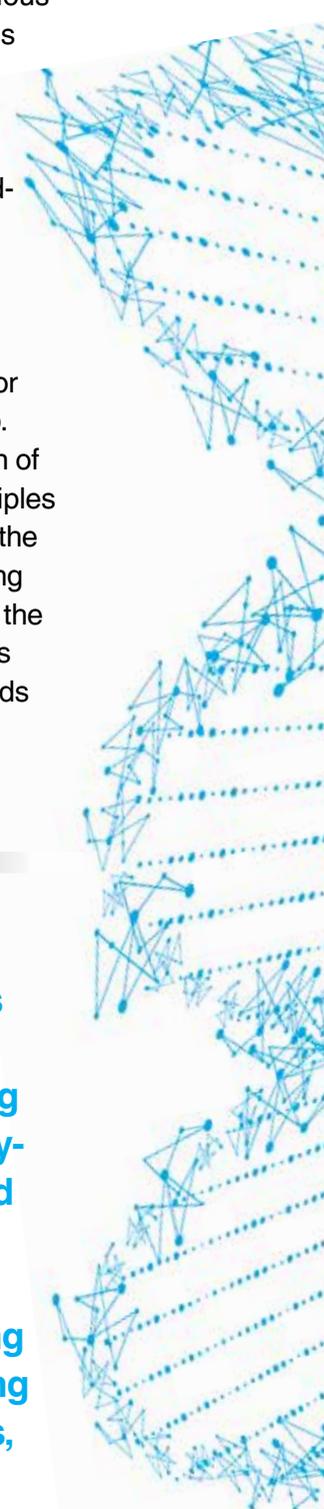
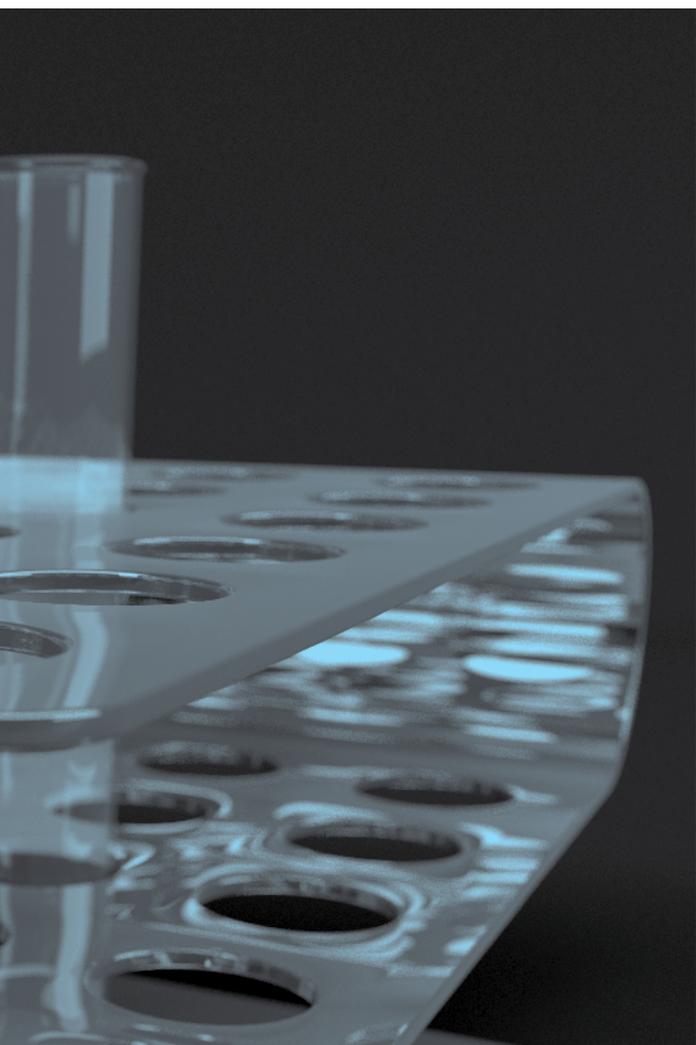
competence, a frame of reference can be offered for the determination of objectives for vocabulary teaching and for the assessment of teaching techniques designed to realize these objectives. According to Richards' assumption (1985) concerning the nature of "lexical competence" and the implications that can be drawn from it as a guide for syllabus design, we can refer to his following statement: "Knowing a word entails knowledge of the underlying form of that word and the derivations that can be made from it" (Richards, 1985, p. 177).

There is now widespread agreement

that acquisition also requires learners to attend to form. Indeed, according to some theories of L2 acquisition, such attention is necessary for acquisition to take place. Schmidt (1994), for example, has argued that there is no learning without conscious attention to form. Again, the term "focus on form" lends itself to more than one interpretation. (Ellis, 2005, p. 212).

Through the basic processes of word-formation, all people are capable of producing words-not only those words they have used or encountered in the past but also "new" words, such as the plural of a noun they have just learned or the past tense of a newly acquired verb. Such words result from the combination of morphemes according to general principles of word formation. Like a child learning the native language, adults who are studying a foreign language must also construct the generalizations about inflectional affixes that would enable them to produce words they have never heard before.

Farrukh Nazi (2017) argues, that research on vocabulary instruction has led to the development of several vocabulary learning strategies. The three widely-used, research-based word learning strategies are teaching students to use context to infer the meaning of unknown words, teaching students to use word parts, and using dictionaries



Action researchers believe that everything is context-bound and that the goal is not to develop a generalizable statement but to provide rich and detailed descriptions of the context so that others can make comparisons with their contexts and judge for themselves whether the findings might apply (Burns, 2010)

The tests of between-subjects effects showed a statistically significant effect of the learning the vocabulary of EAP textbooks through word-formation rules ($F(1,57) = 50.647, p < 0.05$). As a result, the null hypothesis was rejected. Therefore, it can be suggested that learning the vocabulary of EAP textbooks through word-formation rules by students of sciences seems to be more affective than learning it through word-definition.

Discussion and Conclusion

Considering knowledge of word formation as an integral part of lexical

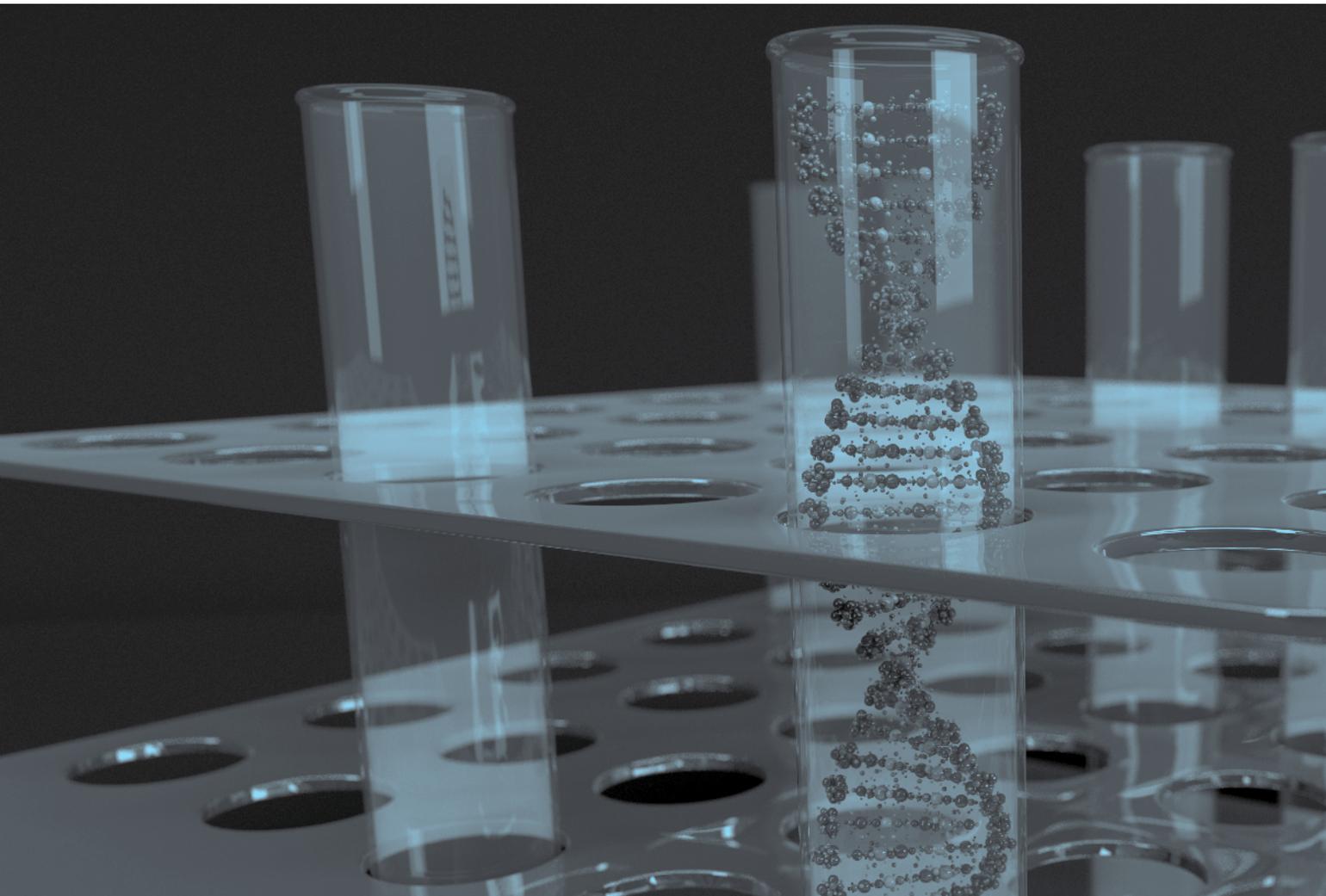


Table1

Groups	Variables	Number of cases	Mean	Standard Deviation	Standard Error
Pre - test C. group		30	8.733	5.132	0.939
Post - test C. group		30	9.433	5.975	1.091
Pre - test E. group		30	9.633	5.000	0.913
Post - test E. group		30	12.933	4.891	0.893

Table2: Test of Between- Subjects Effects Dependent Variable: Post test & Covariate: Pretest

As can be seen from table1, the two groups' means were initially about the same (8.73, 9.63) but, the post-tests show a great difference (9.43, 12.93).

In the second step, ANCOVA (Analysis of Covariance) was carried out in order to compare the results.

Wessels also mentions that the vocabulary Quilt, which is a strategy that pushes students to create connections continually with their prior knowledge and new information they gain, offers EL students the opportunity to activate background knowledge and use their existing resources to connect with target vocabulary

Table2

Source	Type III Sum of Squares	df	Mean Square	F	.Sig
Corrected Model	1803.126 ^a	2	901.563	467.780	000.
Intercept	35.176	1	35.176	18.251	000.
(Method(group	97.613	1	97.613	50.647	000.
pretest	1619.376	1	1619.376	840.220	000.
Error	109.857	57	1.927		
Total	9417.000	60			
Corrected Total	1912.983	59			

from the list given.

- 3) Filling in the blanks with the appropriate forms of different words with different functions from the list given.

In order to construct appropriate tests to examine the participants' performance, the researcher selected the vocabulary items with different functions from the passages which were covered during instruction. The vocabulary items were introduced to the students through sentences and familiar rhetorical structures identical and similar to those they were taught previously. Before administering the developed tests to the main subjects, two parallel forms of the tests were given to a group of examinees similar to the students in the main study. The correlation between the scores obtained from the two single tests was computed to indicate the reliability of the test scores. In order to determine the content validity of the test, a careful examination of the direct correspondence between the content of the developed test and the materials to be tested was necessary. Content validity was checked by scrutinizing the table of specifications as follows:

Content	Number of items	Form of items
Words with different forms & functions made by derivational affixes	12	production
One word with different forms and functions	8	recognition
Different words with different forms and functions	10	recognition

● Procedure

To achieve the aim of the study, the following procedure was followed. First of all, the study adopted a pre-test post-test control group design. Sixty female university students were selected from EAP classes and were divided into two equal groups. Afterwards, each group was assigned to one of the treatment conditions. Subsequently, for each group of the students, certain passages were chosen from their textbook. Following this, the students were taught the new vocabulary items of these passages for eight sessions during two months by using word-formation rules and through word-definition method. Finally, the examinees' performance on the post-tests was analyzed statistically for the purpose of comparing the results.

Results

A pre-test and a post-test were administered to the examinees in the control and experimental groups. In order to carry out statistical analysis and obtain the results, "mean", "SD" and "SE" were established for each group. The results are presented in table 1.

English are acquired relatively late (Nippold & Sun,2008).

the Vocabulary Quilt strategy embeds the characteristics of effective vocabulary instruction. It is designed to actively engage EL students with the academic vocabulary throughout all phases of instructio

From the point of view of internal architecture, there are two kinds of English words. On the one hand, there are words which seem to exist as wholes. On the other hand, there are vocabulary items which are internally complex, in that they can be divided into chunks which they share with other words. If a prefix or suffix can be added on to a stem by a regular rule, then it is unlikely to be already in the lexicon (Aitchison, 2003,p.126-127).

According to He, (2010), Affixation, compounding and conversion are three important ways of creating new words. Affixation consists of suffixation and prefixation. Suffixation is the commonest method of forming new words in English, with certain suffixes being particularly favored. There are three characteristics of suffixation. The first characteristic is that suffixes are normally attached to whole words or phrases, not to bits of words. The second one is that they are mostly added on to major word classes nouns, adjectives or verbs, in order to create another noun, adjective or verb. The third one is that each word class has its own characteristic suffixes. Moreover, adding affixation is also a useful way to master vocabulary.

Learners can guess the meaning of a new word based on its affix.

Due to the importance of word formation in increasing the vocabulary repertoire of students of academic English, the present study aimed at examining the effect of word-formation rules instruction on vocabulary learning. In specific, the study tried to answer the following research question: “Do word-formation *rules have any significant effect in learning the vocabulary of EAP texts by the students of life sciences?*”

Method

This study was designed to examine the role of word- formation rules in learning vocabulary from EAP texts. The study adopted a pre-test post-test control group design. The Participants of the study were sixty female university students from available EAP classes. They were divided into two equal groups and each group was assigned to one of the treatment conditions.

● Instruments

The instruments which were used in this study included administered parallel tests to examine the students’ performance on learning vocabulary in EAP texts. These parallel tests for the sake of pre-testing and post-testing, consisted of 30 items in three formats as follows:

- 1) Filling in the blanks with the correct form of the word in different functions (i.e. *Noun/ Adj./Verb/ Adv.*) represented in a table with 12 items.
- 2) Filling in the blanks with the correct forms of one word with different functions

termed generative vocabulary instruction. According to Flanigan, Templeton, and Hayes (2012), generative vocabulary instruction can make learners independent vocabulary learners by teaching them the skills to devise the meaning of a word by using roots and base words.

In advanced classes, one of the main purposes is to help students become independent, and responsible for their own learning. As the material which is read becomes increasingly difficult, there are many more new words to be explained. If the teacher spends the entire class time explaining the new words and their meanings on the blackboard, there are three unfortunate results: (1) the students remain too dependent on the teacher, (2) the opportunities for learning to use dictionary are lost; and (3) no class time is left for the communicative use of a language.

Review of the Literature

During the past 200 years, scientists working in the western European tradition have abandoned the former use of Latin as the only appropriate language for scientific discourse. But in accepting other languages, they have, nonetheless, maintained the use of a sublanguage of roots, prefixes, and suffixes, either borrowed from Classical or Medieval Latin or Greek, or newly coined words with Greek or Latin word elements. Strevens (1980) in *Teaching English as an International Language* indicates that every scientist needs to be familiar with about fifty prefixes, about thirty suffixes, and about 100 roots.

Like the child learning the native language, adults who are studying a

foreign language must also construct generalizations about inflectional and derivational affixes that would enable them to produce words they have never heard before. In this regard, Falk (1978) in *Linguistic and language* states: A grammar, as an account of a speaker's knowledge of language, must include a list of morphemes used in the formation of words. This list is similar to a dictionary. Information is provided about the pronunciation and meaning of each morpheme, along with details about its grammatical features (e.g., whether it is a prefix, suffix, root) (p. 41).

One widely acknowledged way to build vocabulary is understanding and application of word formation processes, sometimes called "derivational morphology". Among other things, it involves affixation. Bowen (1984) in *TOEFL Techniques* states: "Lexical study should include the pieces that make up words: prefixes, suffixes, stems, inflectional and derivational patterns, enough morphophonemics for the student to be able to associate the *im-* of "improbable" or the *ir-* of "irregular" with the *in-* of "inadequate", and word families (*sign, design, signature, assign, designate*, etc.) to help identify common elements" (Bowen, 1984, p.201).

Mostly, there are multiple layers of affixation, which determine, *organizational of morphologic components*. Derivational suffixes, typical of academic language, are used to convert one part of speech into another. Although some derivational suffixes are used productively even by preschoolers (Berko, 1958), the derivational suffixes typical of academic

Wessels (2011) discusses some key points concerning vocabulary: Vocabulary knowledge is essential to students' academic success. If students do not understand the meaning of the words in the text, they will have difficulty understanding the content. Vocabulary knowledge is the single best predictor of students' academic achievement (White, Graves, & Slater, 1990). With this in mind, effective vocabulary instruction must be a goal of all educators working with ELS, not just those who specialize in English as a second language (Carlo, August, & Snow, 2005). Therefore, discussing new vocabulary in an authentic context is essential for ELS learners (Wessels, 2011, p. 47-48).

Wessels also mentions that the vocabulary Quilt, which is a strategy that pushes students to create connections continually with their prior knowledge and new information they gain, offers EL students the opportunity to activate background knowledge and use their existing resources to connect with target vocabulary. The strategy revolves around a word quilt-which is a learning tool used by students throughout instruction. The use of research-based strategies such as the Vocabulary Quilt can replace traditional vocabulary instruction that heavily relies on worksheets or dictionary work. Traditional vocabulary instruction produces only superficial understanding, and students rapidly forget words (McKeown, 1993). In contrast, the Vocabulary Quilt strategy embeds the characteristics of effective vocabulary instruction. It is designed to actively engage EL students with the academic vocabulary through all phases of instruction. The Vocabulary Quilt strategy thus helps educators facilitate vocabulary

learning not only for EL students, but also for primary English speakers as well. At the end of the lesson, students have a tangible product that documents their learning and can serve as a useful study aid.

Nagy and Townsend, 2012, indicate that academic vocabulary is perhaps the most obvious aspect of academic language, and lack of academic vocabulary knowledge has consistently been identified as an obstacle to students' success (Corson, 1997; García, 1991; Snow & Kim, 2007). We take both general academic words (i.e., words used across disciplines and with greater frequency in academic than nonacademic language) and discipline-specific academic words into consideration.

Farrukh Nazi (2017) argues, that research on vocabulary instruction has led to the development of several vocabulary learning strategies. The three widely-used, research-based word learning strategies are teaching students to use context to infer the meaning of unknown words, teaching students to use word parts, and using dictionaries (Graves, 2016; Hairrell, Rupley, & Simmons, 2011).

Graves (2016) concludes that teaching students to use word parts to glean meaning of the words can be an effective strategy.

According to Kucan (2012), word features are intended to support the vocabulary knowledge of the learner. Rasinski, Padak, and Newton (2011) also indicate that integration of Latin and Greek roots into vocabulary instruction enhances academic vocabulary. In teaching academic vocabulary, researchers also argue for the use of generative vocabulary instruction (Flanigan, Templeton, & Hayes, 2012; Templeton, 2011). Generating multiple different words from a root word is

Abstract

The present study was designed to examine the role of the word-formation rules in learning vocabulary from EAP texts by students of life sciences. The study adopted a pre-test post-test control group design. The participants of the study were selected from available EAP classes held for the students of life sciences. Then, the subjects were divided into two equal groups and assigned to one of the treatment conditions. The students were then taught the new vocabulary items of the passages chosen from their textbooks for eight sessions during two months in two different ways: using the word-formation rules and word-definition method. At the end, the examinees' performance on the tests was analyzed statistically for the purpose of comparing the results. The analysis showed a significant difference between the two groups. As a result, it can be claimed that instruction - according to the word-formation rules" - was effective.

Key Words: word-formation rules, word-definition, vocabulary, English EAP Textbooks.

Introduction

As mentioned by Riazi and Aryashokouh (2007), focus on vocabulary as a central part of the language learning process is getting widespread attention today, and second language vocabulary acquisition has been taken into consideration by many researchers (e.g. Hatch & Brown, 1995; Coady, 1997; Lewis, 1997; Schmitt, 2000; Newton, 2001; and Nation, 2002). Different researchers have proposed different approaches to vocabulary teaching. For instance Hunt and Beglar (2002) introduced three approaches to vocabulary teaching and learning.

The first approach is incidental learning of vocabulary, which requires teachers to provide opportunities for extensive reading and listening and is useful for more proficient intermediate and advanced students. However, Coady (cited in Hunt & Beglar, 2002) doubted the possibility of learning words through extensive reading when learners do not know enough words to read well.

The second approach is explicit instruction, which provides opportunities for intentional learning of vocabulary by providing word lists or glosses and is

effective for beginning and intermediate students who have a limited range of vocabulary

The third approach is independent strategy development, which involves training learners to use dictionaries and practice guessing from context that is beneficial in retaining words. Some researchers (Stahl & Fairbanks, 1986 cited in Knight, 1994; Prince, 1996) insist that a combination of contextual and definitional approaches can be more effective than either approach in isolation. It can be concluded that each of these methods can be effective if it is used appropriately with the aim of raising consciousness among students.

As mentioned by Riazi and Aryashokouh (2007), focus on vocabulary as a central part of the language learning process is getting widespread attention today

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The Role of Word-Formation Rules in Learning Vocabulary of English EAP Textbooks by Students of Life Sciences

چکیده

تحقیق حاضر، نقش قواعد شکل‌گیری واژگان (واژه‌سازی) در یادگیری لغات متون EAP توسط دانشجویان دانشگاه‌ها در رشته‌های علوم را ارزیابی و بررسی می‌نماید. از این‌رو، برای پیشبرد روند تحقیق، تعداد شصت نفر دانشجوی زن از میان دانشجویان قابل دسترس در کلاس‌های آموزش زبان EAP در رشته علوم، از یکی از دانشگاه‌های تهران، انتخاب و به دو گروه مساوی تقسیم شدند. در مرحله نخست، پیش‌آزمونی براساس متون درسی آن‌ها طرح شد و به اجرا درآمد. سپس برای هر گروه از دانشجویان در هر یک از گروه‌های آزمایش و گواه، متونی از کتاب‌های درسی آنان انتخاب شد و لغات جدید طی هشت جلسه در مدت دو ماه با دو روش «شرح قواعد واژه‌سازی» و «توضیح معنای واژگان» تدریس گردید. در مرحله بعد، پس‌آزمونی براساس متون درسی تدریس‌شده به اجرا درآمد. در پایان، عملکرد دانشجویان در آزمون‌ها مورد بررسی و تجزیه و تحلیل آماری قرار گرفت. تفاوت عملکرد دانشجویان در دو آزمون در حدی بود که فرضیه خنثی رد شد و فرضیه مثبت جهت‌دار مورد قبول واقع گردید. بنابراین، نتیجه‌گیری شد که آموزش لغت با استفاده از قواعد شکل‌گیری واژگان تأثیر عمده‌ای در فراگیری لغات متون درسی تخصصی EAP توسط دانشجویان علوم دارد.

کلید واژه‌ها: قواعد شکل‌گیری واژگان، واژه‌سازی، واژگان، متون تخصصی انگلیسی برای اهداف دانشگاهی، دانشجویان رشته‌های علوم زیستی