

**Acquisition of Latin Roots with Implications for EAP**

**Buğra Zengin**

**bzengin@rocketmail.com**

**Ali Rıza Erdoğan**

**elifcan@rocketmail.com**

**Suna Akalın**

**sunaaakalin@yahoo.com**

**Abstract**

This study explores whether semantically elaborated keywords facilitates learning of Latin roots. The freshmen of a medical school were the treatment group provided with the translation equivalents of the target roots supplemented with keywords. The control group (second year students of the same medical school) received only Turkish translations; the anatomy courses in their first year had also familiarized them to the roots incidentally.

After a pretest and the subsequent presentation of the self-study materials, they were informed of a similar test they will take three weeks later. The students assumed their testing is over; however, fifteen weeks later a similar test was administered to assess in which group the decline might be lower. With t-tests and ANOVA, all the pairwise comparisons (pretest – first posttest, pretest – second posttest and first posttest – second posttest) indicated statistically significant differences acquired by the treatment group with implications for English for academic purposes.

**Keywords:** Latin roots, keyword-semantic method, memory, L2 vocabulary learning, English for academic purposes

**Background of the Study**

English as an international language has a high status in the academic world. Eighty percent of the computer data and eighty five percent of all information are stored in English (Thomas, 1996: cited in Alptekin, 2002). It indicates the significance of English in terms of academic advancement. Although little is left of the classical education system that was adopted in England for centuries from an early age, it still has its marks due to the number of Latin and Greek words borrowed into English. Especially medical and legal vocabulary can easily be derived from Latin and Greek words.

Scientific terminology relies profoundly on word of Latin and Greek origin. Most of the common words have Germanic origin; nevertheless more than half of English words either have a French cognate or come from the French language, which is a Latin based language (wikipedia, n.d.). Research findings as to the sources of English vocabulary (Bird, 1987, 1990; Roberts, 1965, Grinstead, 1924: cited in Nation 2001, p. 264-265) show the predominance of words of Germanic origin in the first most frequent one-thousand words, but thereafter Italic and Hellenic words predominate in the second thousand averaging 60 % of English vocabulary. Bird's analysis is in parallel with Roberts' (1965: cited in Nation, 2001) and Grinstead's (1924: cited in Nation, 2001): the most frequent one thousand words contain around five hundred seventy words of Germanic origin and those derived from Latin and French make up 36 % in the first thousand. Thereafter the former drops to three hundred sixty words and the latter rises to fifty-one percent.

According to Nation (2001, p. 264) learning roots has two advantages: firstly, in case of unfamiliar words, one can relate the unknown to the known. Secondly, it helps to check whether guessing from context is successful. Considering the effect of Latin and/or Greek roots in academic English, it is essential to develop vocabulary strategies focusing on Latin roots. They may be influential both in general and for specific purposes. Greek roots are especially helpful in deriving meanings of medical terms. However, some disciplines in the science of medicine require more focus regarding Latin roots. For instance, they have dominance in the branch of Anatomy. This course is taken not only by medical students but also many students in various departments (nursing/midwifery, physical education and preschool education) of universities. Besides, many academic words are derived from Latin roots. Due to the high memory load academic vocabulary performance demands, it requires some attempts to find solutions in this regard, which would be used to facilitate vocabulary component of English used in academic contexts or as a foreign/second language in general.

### **Literature Review**

The study of vocabulary is an essential part of language learning (Adolphs & Schmitt, 2004). Bellomo (1999) states that it is possible to see clearly, through empirical research and self report surveys, that "vocabulary acquisition is one of the more important needs of the foreign adult student learning to read English." Research shows the significance of vocabulary learning for the academic world (Coady &

Huckin, 1997; Schmitt, 2000; Nation, 2001). As for the development of vocabulary, both top-down and bottom-up approaches can be beneficial. However, the issue of selecting either category should not lead to a dichotomy. The preference of any of them should be a matter of continuum. Carter (1998) argues for the benefit of word lists but cautions that words should be taught through both lists and contexts.

Many researchers are in consensus on suggesting the benefit of direct learning of 2000-3000 words selected on the basis of frequency at the beginners' level (Laufer, 1997; Grabe & Stoller, 2002; Nation & Hwang, 1995). Coady (1999, personal communication: cited in Bellomo, 1999) recommends their benefits as well; however, his argues that the way they are used should be incidental through repeated exposure to low-level texts of students' choice and interest.

The priority shifts toward the contextual use at the intermediate levels, but this does not suggest the ignorance of word lists at any level. Cobb and Horst (2006) emphasize the inevitability of academic word lists and they state the inadequacy of the concept of frequency suggesting the significance of key vocabulary words to be competent in comprehending academic texts and it is unrealistic to reach the threshold level only through reading practice.

Proficiency in reading is essential to academic English. However, it is a prerequisite for inferring meaning from any text to know 95% of the vocabulary content. Laufer (1997) states the threshold for a reading proficiency is 3000 words. According to Nation and Newton (1997: cited in Bellomo, 1999), West's list of most frequently used 2000 words in English text accounts for % 85 of written English. Nation's university list of 800 academic words (1990: cited in Bellomo, 1999), accounts for an additional eight percent. Even if the course-specific 2000 word-list of technical nature provides an additional 3% to the most commonly read vocabulary, there are more than 120000 items that constitute the remaining four percent, which makes it indispensable to integrate word attack strategies to direct teaching to derive meaning from any words that may not be known due to their low frequency. In parallel to frequency word lists, a roots list can be formed as part of a strategy to recognize those words or understand their meaning senses. McGavin (1990: cited in Bellomo, 1999) organized an English curriculum assigning to her eighteen high school students a target list of eighty common Latin roots and reported that this list demonstrated a positive correlation between vocabulary growth and comprehending vocabulary through the knowledge of roots and affixes. With Latin roots, according to Smith (1995: cited in

Bellomo, 1999), it is possible to derive nearly 50% of the English words; many words are derived from Greek as well.

This suggests raising the priority degree of the bottom-up approach beyond beginners' level. Studying such lists would give boost to vocabulary development of an L2 learner. According to Nation (1990, pp. 168-174: cited in Gu, 2003), L2 learner develops his/her vocabulary skills by breaking a new word into its parts for the affixes and roots to be revealed, by knowing what these parts mean; and by the ability to connect the meaning of the parts with that of the word. Pittman (2003) emphasizes that conditions should be constructed for students to familiarize with roots, prefixes and suffixes, which make up complex words, which express abstract ideas. It would be one of indispensable ways to systematize vocabulary building, which is limited to memorization of individual words in textbooks. According to Pittman (2003), the L2 teacher can introduce to his/her students the most utilized word parts that, "in their many combinations, make up 50% of the English language."

Nation (2001) notes the significance of word building systems of English to enable learners to make the most use of them and considers it important to check that they not only have the knowledge but also use it where appropriate. He underlines this importance by these remarks: 'Using word parts to help remember new words is a major vocabulary learning strategy. It deserves time and repeated attention because it can involve such a large proportion of English vocabulary' (Nation, 2001, pp. 280-281). According to Nation (2001), knowledge of affixes and roots can be useful in two ways. It is easier to learn an unknown word by relating the known word to the unknown or to known prefixes and suffixes. In addition to the knowledge of the meaning of the parts and their combination to make a new but related meaning, it will help learners to see the ways in which the meaning of the parts relates to the dictionary meaning. 'This then allows the parts to act as mnemonic devices for the meaning.' (Nation, 2004, p. 274). Bellomo's (1999) experiment indicated that both the treatment group with Latin-based native languages and those with non-Latin based first languages learned equally well from implicit vocabulary instruction utilizing word parts despite the pre-test difference in favor of the former group due to Latin cognates.

Effective vocabulary strategies developed reflect their virtues on other dimensions of language use. Hulstijn (1997) emphasizes on the consensus among most theorists on the impossibility of a clear borderline between encyclopedic knowledge and lexical knowledge, and no category of knowledge is stored as a separate information

module in long term memory (Aitchison, 1987; Lakoff, 1987; Levelt, 1989: cited in Hulstijn, 1997, p. 211). Another consensus is on the fact that words in the mental lexicon should not be regarded as clear-cut entities (Meara, 1992: cited in Hulstijn, 1997), which is based on the availability of word knowledge being partial. In the incremental process of vocabulary learning, transition occurs from declarative knowledge to procedural knowledge through practice following cognitive, associative and autonomous stages. (ACT theory – Anderson, 1983, 1985: cited in Mitchell & Myles 1998:87-88).

Interaction among the kinds of knowledge transfers more directly to reading skill, which in turn interacts with other skills. However reading practice activities alone is not adequate. Research into vocabulary acquisition shows that combining direct-teaching methods of vocabulary with context use brings about the highest positive effect on language learning (Zimmerman, 1994: cited in Gu, 2003; Nation, 2001; Paribakht & Wesche, 1997). This is in parallel with Oxford and Scarcella's (1994) emphasis on the benefit of using several and diverse strategies in combinations differing based on the priorities of students. It is also Oxford (1990) who considered the need to elaborate the classification of cognitive strategies into the cognitive and the memory categories, which includes the keyword technique.

There is a number of studies comparing the keyword method to a no-strategy condition on a number of languages (e.g. Russian - Atkinson, 1975; Atkinson & Raugh, 1975, Spanish - Levin, Pressley, McCormick, Miller, & Shriberg, 1979; Pressley, 1977; Pressley, Levin, Hall, Miller, & Berry, 1980; Raugh & Atkinson, 1975, Latin - Pressley, Levin, Nakamura, Hope, Bispo & Toye, 1980, and German - Desrochers, Gelinias, & Wieland, 1989; Hall, 1988: cited in Brown & Perry, 1991). Besides, Nation (2001) mentions keyword research into Hebrew, the Phillipino language, French, Greek and Chinese.

Gu (2003) states that overwhelming amount of research shows the superiority of the keyword technique with exception of a few studies in classroom contexts (Fuentes, 1976; Levin, 1979; Willerman & Melvin, 1979: cited in Gu, 2003). To these we can add a few other experiments conducted in classrooms, mixed 2 x 2 factorial ANOVAs of which indicated some unsatisfactory results regarding Latin as L2 and Spanish as a Latin based L1. Campos, Gonzales and Amor (2003) compared the recall performances of randomly selected 30 non-cognate Latin words (those with high image value) by 44 secondary school students, whose first language, Spanish, is Latin based.

The research was conducted in the classrooms of the participants half of which formed a treatment group and another half a contrast group. In addition to the Latin word list with Spanish equivalents, which was also provided for a rote recall to the contrast group, the keyword group was presented a keyword with acoustic similarity and was required to visualize an interactive image that related the keyword with the target word. Both immediate and one-week -delayed recall (they have not been forewarned about the test) was measured and the analyses showed that the rote group exhibited better performance in both, although the delayed recall was lower than the immediate recall. Campos et al. (2003) found that the result of their experiment was in agreement with those of other researchers in the literature (e.g. Fuentes, 1976; Hogben & Lawson, 1994; Levin, Pressley, McCormick, Miller & Shriberg, 1979: cited in Campos et. al, 2003).

The evaluation of the results indicated that, for adolescents, the keyword method was no more effective than other methods when the presentation was done to the group rather than the individual and when the way they studied the list was self-paced. The same finding applied in Campos et al.'s (2003) subsequent experiment (with 153 adolescents), which differed only in that the application of the keyword method procedure included investigator-supplied drawings and this was compared to the habitual method of the contrast group. The adolescent participants in both of the experiments neither studied Latin nor knew about the keyword method. The results were the same when the participants were undergraduate students of psychology or of occupational therapy with a basic knowledge of Latin but no prior knowledge of the keyword method.

Campos et al (2003) stated that laboratory conditions with researcher-paced presentation of the technique were inadequate to argue for the required positive effects it would bring about in real-life learning situations with large groups and participant paced presentations. Finally they emphasized on the need for further studies for the identification of the keyword-method procedures: the circumstances in which keywords are not effective and the circumstances in which they are effective and the reasons for both. By far, there seems to be consensus among researchers (Gu, 2003; Nation, 2001; Hulstijn, 1997; Brown & Perry, 1991) on the fact that it is limited to short term recall and retrieval and fails to provide good results in terms of long term memory due to the lack of depth. Such a study to measure the effect of semantic/conceptual elaborations was conducted in authentic classes with authentic students. Brown and Perry (1991) compared three strategies of keyword alone, semantic method and the

combination of both on Arabic speaking students at Cairo University. The combination raised the retention rates of their ESL vocabulary in both one-day and nine-day delayed posttests. This encouraged our study which investigated the Turkish settings and Latin roots. However, the results of the nine-day posttests in Brown and Perry's research (1991) were not statistically significant. The reason for this may have been, as Brown and Perry (1991) self-critically discussed on, the requirement in the tests that students give the English (L2) synonyms, instead of Arabic (L1 in their study) ones. This study showed the need for further research into whether a combination of semantic methods and keyword method would show statistically significant gain.

Results of experimental studies may reveal theoretical basis of the treatment materials. It is a fact that, in some cases, theorizing has implications for experimental research. Theories imply that semantic depth and/or spread of elaboration on forms and/or meanings help the vocabulary acquisition. Craik and Lockhart's theory of depths of processing (1972) suggests that semantic methods entail processing on the conceptual depth. Craik and Tulving's expansion of this theory (1975) cover elaboration at structural as well as semantic elaborations as they are the reflections of the conceptual depth on the surface levels. Cummins (2005) argues for L1-L2 overlap in conceptual levels and their signs on the partial similarities of forms, which L2 learners may process.

As to whether this process is implicitly or explicitly handled, there are two different views. Those who hold implicit view defends for a non-interventionist position according to which manipulating and controlling the students' verbal behavior is quite limited. According to this view, 'there seems to be a universal and common set of principles which are flexible enough and adaptable to the large number of conditions under which language learning may take place (Felix, 1981, p. 109: cited in Doughty, 2004, p.181). For incidental vocabulary learning to occur, a new word is identified from the larger input set and through inference appropriate semantic information for that word is made available. According to Williams (2004, p. 203), as an inevitable consequence of encoding individual events in memory, which are represented as sets of features, humans are equipped with extracting regularities, or underlying generalities. On the other hand, those defending the explicit view defend it for the benefits of a relevant and principled instruction. The answer to which approach is suitable is that it is

somewhere in the middle of the continuum, and that it is the combination of both that can make available the information needed for form-meaning connections.

Explicit learning of vocabulary can be integrated into indirect or incidental learning activities, in which students systematically meet the words they have previously seen. In this accumulative and graded process, the frequency of words increases the probabilities of a threshold level of performance. It is only a matter of degree to which both implicit and explicit approaches are applied.

### **Aims and Research Questions**

The purpose of our research is to study the effect of providing, as course materials, authentic students with Latin root – Turkish synonym glossaries supplemented with keywords elaborated with visual/acoustical and semantic processing in comparison to glossary-only material. The experimental group material is a little more explicit in its approach to learning due to some content that attempts to guide the learner. All materials were presented in authentic classrooms with authentic students. The students were informed they would be tested in three weeks time following the pretests. In order to study the differential effects over time, treatment effects were studied after both three weeks and four months.

Depending on the aims of the study mentioned above, the study includes two research questions:

1. Do experimental group materials have an effect on their learning Latin roots in terms of incidental learning?
2. Can the use of the combination of the keyword technique with semantic processing develop the ability of language learners to relate cross-linguistic and semiological similarities?

### **Method**

#### **Sample group**

The participants in the study were the freshmen and juniors of the Faculty of Medicine at Ataturk University, in Erzurum, Turkey. All the students were Turkish. The control group consisted of juniors, who have already learned Latin roots-oriented anatomical terms. This study covered only the Faculty of Medicine because it was considered it is worthwhile to see whether this method could raise the standards of the terminological literacy in the education of doctors. However, we think such experiments

should also be conducted in graduate prep schools where the aim is to help students be proficient in terms of Academical English vocabulary, 60 % of which is Latin originated. We could not cover these schools for a comparative experimental study because there was no adequate time to tolerate the experiment due to the concerns of students who prepare for the nationwide Standard tests. Nevertheless, the fact that these students do not have any prior knowledge of Latin roots is a plus to conduct such an experiment.

Another problem would occur due to the conditions of authentic classes which make it impossible to prevent any information leak that can be passed through between the classes. This is the very reason for the choice of freshmen as experimental groups and juniors as control groups, although the latter had a certain advantage in terms of prior learning.

### **Tools**

**Roots:** The fact that the tested material being roots itself made the choice process easier because there was no direct or indirect teaching/learning of the meaning of roots in isolation. There were two criteria in choosing the roots to be learned. They had to be appropriate and relevant for the medical students, yet they were to be of a kind that can be applied to general audience. Due to Latin's dominance in the field of Anatomy, Greek roots (which can be used to derive the meanings of medical vocabulary in general) were only three in number.

Fifty-item lists (fourty-seven Latin roots and three Greek roots) were presented as a test to students who were required to write synonyms in Turkish, as Turkish language counterparts are adequate to give the same meanings. To prevent any advantage that memorizing the list can transfer from the word list and the two tests, the sequence of the words in all the tests were changed. Keywords were experimenter generated and in Turkish, which was appropriate for students, who were native speakers of Turkish.

Sample for the study material presented to the experimental group:

CAP, CIP baş (head)

KAPtanımız BAŞımız.

English translation: Our captain is our head.

Mecazi anlamda düşünürsek bir şişenin KAPAĞINI onun BAŞına benzetebiliriz.

English translation: Metaphorically thinking, there are similarities between the lid of a bottle and a head.

Kapak haber olmak baş haber önemi taşır.

English translation: Being in the banner headlines (among the main news) is important. Teknolojik cihazları kontrol eden merkezi başa benzetebiliriz, bu kontrolde ÇİPLER rol oynar.

English translation: The concept of “head” might be used a metaphoe for a center where technological devices are controlled.

CAPT/CEPT almak (take), tutmak (hold), yakalamak (seize)

Bu işi KAPTIM, CEPTE keklik.

English translation: I got this job, partridge in the pocket (piece of cake).

Control group was only provided with the root lists and their translation equivalents.

CAP, CIP: baş

CAPT/CEPT: almak, tutmak, yakalamak

### **Categorization for keyword:**

L1 (Turkish) keywords: Acur, anım/hanım/canım, kaptım/cepte, dolama/acı dolu, eyi, musluk, gravat/grev, levha/alev, eloğlu, Marmara, moral, cep/pek, pervane, peri, razı, pota, pir, razı/rızık, sedir/site, tık, topuk/toprak, vana/vın, vana, ters,

Words borrowed from other languages: antre, filozof, potansiyel (general), Amor (from the song Amor, amor, amor), bye, dominant viva İspanya (popular culture) anarşi, fraksiyon, dük (politics), krat (jewellery), lig, parkur, kaptan (sports), prime-time (media), tribün, turbulans, çip, vantilatör, vakum, traktör, sinerji/sempozyum, , amip, ambulans, ortodonti, vitamin,

Combinational: Amor/amin, ambulans/hamal, kaptan/çip/kapak, parkur/kurulmuş, potansiye/pot kırmak, dominant/dam, prime time/pirim/prim, pota/potansiyel/pot kırmak,

English (additional to Turkish) keywords: Ven,vene, vent: went, one

Private name: Marmara

Reverse: dis/zıt, ven/new, anim/minare, pec/cep, pet/tepe

Local use: eyi, eyi, gravat

Onomatopoeic: fsss (suggestive of water running from the tap), pat diye (suggestive of dramatic effect), vın diye (suggestive of speediness)

Idiomatic use: söz ver, acı dolu, elođlu, tepe taklak, periler sarmıř, Allah razı olsun, tık yok.

The material was written by one of the authors of the article, however it took its final shape after counseling the other author (who was the docent professor in the Faculty of Medicine) who selected the ones which were appropriate for his classes (adding a few examples of his own) and finally the material was adopted for his classes through their negotiation. The test papers were marked by one researcher. Each correct answer was given one point thus the top score was fifty and the lowest score was zero.

The pre-experimental tests were administered to measure and assess prior knowledge of the roots of all the students. Then they were informed of the second test (first delayed post-test) they would take three weeks later to motivate them to reach their maximum levels through intensive treatment period. The experimental group was also informed that this is an experiment which aims to develop methods/materials. The third test (second delayed post-test) measured how many of the words they would recall. As they presumed, there wouldn't be any roots test; they didn't study any roots during the subsequent weeks. We wanted to get results after an incidental learning process. Since our aim was to see how many of the roots they would keep in their memory and retrieve when tested, the fact that the reliability coefficient between the second and third tests has key importance.

## **Procedure**

A nonequivalent control-group design (Borg & Gall, 1989) was used in this study. There was a control group and an experimental group, which were both authentic students taking tests from the materials provided to in authentic classroom situations.

The experimental group consisted of first-year students of the medical school. The control group was the juniors of the same faculty. The breaking-up of either class would result in randomization of individual differences; however it was for the instructional program used in this study to tolerate it. On the other hand, any fully randomized experimental designs lack ecological validity. This can get in the way of the intention of such a study: providing feedback for the instructional solutions of the practitioners.

A quasy-experimental design was produced making use of pre and post-test scores. Both groups were presumably studying with genuine motivation because their use of terminology (which is Latin-oriented) is both directly and indirectly influential on their academic and professional lives. Besides, students were informed that their performance in the delayed posttests would be an essential part of the average of their laboratory grades. The experimental group used semantically and/or structurally elaborated keywords to supplement the Turkish translation lists of the Latin roots. The control group used only the list that included the Turkish translations of the Latin roots to supplement the gradual accumulation stemmed from the incidental learning of anatomical terminology over one year.

## **Data Analysis**

### **Statistical analysis**

SPSS was used to analyze the results of the tests. Pairwise t-tests were to compare the pretest and the first delayed post-test, the pretest and the second delayed post-test as well as the first delayed post-test and the second delayed post-test. Since there two groups of students – experimental and control – a two-way repeated measure ANOVA test was run to investigate the interaction effect between the different tests and different groups. That is, comparisons were made between the results for the first year students in the experimental group and the second year students in the control group for all three tests. Only the scores of the students who took all of the three tests were taken to be valid. If a student missed any of the three tests, it wasn't included in our evaluation.

The scores of both treatment and contrast groups indicated no significant pre-experimental differences to the favor the treatment group. The study compared the recall performances of two groups measuring their progress in the interval between the pretest and the delayed posttest one, the pretest and the delayed posttest two, which was

administered subsequent to the first posttest as well as the interval between the two posttests.

Mixed two x two factorial Anovas were performed due to the four levels in our comparison of two independent groups and their pre- and post-test scores. The treatments were the combinations of levels (pretest and posttest) of the factors (the treatment group and the contrast group). The results of the analyses revealed that the keyword-semantic group's retrieval increased statistically significantly in comparison to the contrast group (See Tables 1-6). In other words, in the repeated measures ANOVA conducted, the interaction effect of the two factors in each comparison was found to be statistically significant. According to the results of the tests conducted to compare the progress of the groups in the three-week pre- and posttest interval, the interaction effect of the treatment group and the contrast group was ( $F_{(1,133)} = 7.274, p = .008$ ) (See Table 2.). The comparison of the progress in the 15-week interval indicated that the interaction effect of the two factors was ( $F_{(1,133)} = 115.410, p = .000$ ) (See Table 4.). The interaction effect was ( $F_{(1,133)} = 9.819, p = .002$ ) (See Table 6.), according to the analytic comparison between the delayed posttest one and the delayed posttest two.

## **Conclusions and Discussion**

### **Results**

As a result of this study, we concluded that supplementary materials written by a combination of keyword and semantic methods can help the retrieval of roots. Although there was significantly better gain in the experimental group than the control group, the reason for the higher scores of the first delayed post-tests was memorization prior to the exam. Due to a long interval and the students' assumption that The final test (second delayed post-test) showed decline in terms of memory for both groups. However, this decline was significantly lower for the control groups.

### **Comparison and Implication**

Literature on Latin and Greek roots focused mainly on how their knowledge can be used to guess the meanings of words (Nation, 2001). Bellomo (1999) included Latin roots as test items in his experiments devised to reach empirical evidence demonstrating the hypothesis that the use of etymology, referred to as comprehending vocabulary through the knowledge of roots and affixes, is an efficacious word attack strategy

regardless of the student's original language background,” and found that there is no advantage for the participating students whose language were Latin-based. Bellomo (1999) concluded that “etymology” “may be a viable word attack strategy useful for a college level, heterogeneous ESOL reading class, irrespective of a student's L1”. Due to the small size of his study group to reach a firm prediction or to draw strong inferences, he encourages the replication of this study.

Our study directly inquires into whether a memory strategy can result in significantly better retrieval of roots (Latin-oriented). Further, the semantic-keyword method was tried on word parts instead of whole words; Brown and Perry (1991) tested its effect and found a difference in the treatment groups’ favor compared to other groups (only keyword and only semantic) in their experimental study (1991) of six intact upper level classes at the English Language Institute of the American University of Cairo. Nevertheless, the difference was not a significant one. Their list consisted of 40 English words found in a first-year college text-book. On the other hand, we preferred to work with Latin roots themselves since their retention was believed to bring facilitation as regards academic word lists. Our list consisted of forty-seven Latin roots, which suggests its significance for learning English for academic purposes as well as its facilitating features for the terminology of the Anatomy course. Creative process of relating word parts transfers to other relations in higher-order levels of language use.

### **Recommendations**

Learning Latin roots can be related to the instruction of word parts in English for Academic purposes. In order to make this instruction principled, there are some general guidelines summed up by Nation (2001, p. 274): A large number of complex words should be learned as unanalyzed wholes before dealing with word parts, the development of which is a long process of creative activities of understanding and producing. Nation (2001) also articulates about affixes in relation to stems stating that the instruction should be structured as to focus on one affix at a time and in sequencing stems and affixes with higher frequency should be criteria in terms of cost/benefit analysis. It would be an additional benefit to geometric increase of vocabulary through their roots. Hopefully our study serves to the need to encourage learners to see the underlying regularities of form and meaning patterns and take risks keeping also in mind, as Nation (2001, p. 275) articulates, that the high number of complex words that are not based on regular, frequent patterns (and lacking predictability and semantic

transparency) require both the learners' and the teachers' skill to be able to recognize the cases when they are best learned as unanalyzed wholes.

### **Limitations**

This study covered only the Faculty of Medicine. This was the reason for including the Greek roots, which were very few in number. It was considered that they might make the work sound more relevant, and motivating for the students who perform worse but after the experiment we thought that we might have replaced these with easier Latin roots. Administrations of the tests were considered as worthwhile as their analyses would give us evaluation to find whether the combinatory method could raise the standards of the terminological literacy in the education of medical doctors. However, the curriculum tolerated testing only roots. Besides, the test items would have included the prefixes and suffixes as well as the vocabulary made up of the target roots, prefixes and suffixes. Instead, the conclusions were drawn from what we could infer from the nature of form-meaning connections. The kind of test item used (roots) was considered to be a micro unit in which connections between the form and the meaning were exercised, which might, in our opinion, give the idea that the results might be generalized to larger units of the target language.

We think such experiments should also be conducted in graduate preparation (English preparation) schools where the aim is to help students be proficient in terms of Academical English vocabulary, 60 % of which is Latin originated. We could not cover these schools for a comparative experimental study because there was no adequate time to tolerate the experiment due to the concerns of students who prepare for the nationwide Standard tests. Nevertheless, the fact that these students do not have any prior knowledge of Latin roots is a plus to conduct such an experiment.

Another problem would occur due to the conditions of authentic classes which make it impossible to prevent any information leak that can be passed through between the classes. This is the very reason for the choice of freshmen as experimental groups and juniors as control groups, although the latter had a certain advantage in terms of prior learning.

### **Further Research**

The need for further research on the effect of mnemonics on roots is impending. As Latin is well-suited to this kind of research, research opportunities should be

evaluated as they arise due to their promising potential for EAP (English for Academic purposes).

Table 1.

*Means and Standard Deviations for the treatment and contrast groups at the Faculty of Medicine, Ataturk University to compare the results of the pretest and the delayed posttest 1*

|                    | <u>Method</u>      | <u>N</u> | <u>Mean</u> | <u>Standard deviation</u> |
|--------------------|--------------------|----------|-------------|---------------------------|
| Pretest            | Keyword-semantic   | 35       | 1.89        | 1.83                      |
|                    | Traditional method | 100      | 2.25        | 1.53                      |
| Delayed posttest 1 | Keyword-semantic   | 35       | 39.14       | 15.00                     |
|                    | Traditional method | 100      | 31.08       | 16.37                     |

Table 2.

*ANOVA Results for the treatment and contrast groups at the Faculty of Medicine, Ataturk University to compare the results of the pretest and the delayed posttest 1*

| Source of variance                       | Ss        | Df  | Ms        | F       | p      |
|--|-----------|-----|-----------|---------|--------|
| Between groups                           | 18479.83  | 134 |           |         |        |
| (Group) Keyword-semantic/<br>Traditional | 768.289   | 1   | 768.289   | 5.769   | p=.018 |
| Error                                    | 17711.541 | 133 | 133.169   |         |        |
| Within groups                            | 74368.861 | 135 |           |         |        |
| (Measure) Pretest – Posttest             | 56615.876 | 1   | 56615.876 | 447.346 | p=.000 |
| Group * Measure                          | 920.587   | 1   | 920.587   | 7.274   | p=.008 |
| Error                                    | 16832.398 | 133 | 126.559   |         |        |
| Total                                    | 92848.691 | 269 |           |         |        |

Table 3.

*Means and Standard Deviations for the treatment group and contrast groups at the Faculty of Medicine, Ataturk University to compare the results of the pretest and the delayed posttest 2 administered subsequent to the delayed posttest 1*

|         | <u>Method</u>      | <u>N</u> | <u>Mean</u> | <u>Standard deviation</u> |
|---------|--------------------|----------|-------------|---------------------------|
| Pretest | Keyword-semantic   | 35       | 1.89        | 1.83                      |
|         | Traditional method | 100      | 2.25        | 1.53                      |

|            |                    |     |       |      |
|------------|--------------------|-----|-------|------|
| Delayed    | Keyword-semantic   | 35  | 24.43 | 9.49 |
| Posttest 2 | Traditional method | 100 | 7.49  | 7.67 |

Table 4.

*ANOVA Results for the treatment and contrast groups at the Faculty of Medicine, Ataturk University to compare the results of the pretest and the delayed posttest 2 administered subsequent to the delayed posttest 1*

| Source of variance                       | Ss        | Df  | ms        | F       | p      |
|--|-----------|-----|-----------|---------|--------|
| Between groups                           | 8326.407  | 134 |           |         |        |
| (Group) Keyword-semantic/<br>Traditional | 3561.016  | 1   | 3561.016  | 99.386  | p=.000 |
| Error                                    | 4765.391  | 133 | 35.830    |         |        |
| Within groups                            | 18359.375 | 135 |           |         |        |
| (Measure) Pretest – Posttest             | 10005.945 | 1   | 10005.945 | 297.552 | p=.000 |
| Group * Measure                          | 3880.967  | 1   | 3880.967  | 115.410 | p=.000 |
| Error                                    | 4472.463  | 133 | 33.628    |         |        |
| Total                                    | 26685.782 | 269 |           |         |        |

Table 5.

*Means and Standard Deviations for the treatment group and contrast groups at the Faculty of Medicine, Ataturk University to compare the results of the posttest 1 and the posttest 2*

|            | <u>Method</u>      | <u>N</u> | <u>Mean</u> | <u>Standard deviation</u> |
|------------|--------------------|----------|-------------|---------------------------|
| Delayed    | Keyword-semantic   | 35       | 39.14       | 15.01                     |
| Posttest 1 | Traditional method | 100      | 31.08       | 16.37                     |
| Delayed    | Keyword-semantic   | 35       | 24.43       | 7.08                      |
| Posttest 2 | Traditional method | 100      | 7.49        | 7.67                      |

Table 6.

*ANOVA Results for the treatment and contrast groups at the Faculty of Medicine, Ataturk University to compare the results of the posttest 1 and the posttest 2*

| Source of variance                       | Ss        | Df  | Ms       | F      | p      |
|--|-----------|-----|----------|--------|--------|
| Between groups                           | 37360.319 | 134 |          |        |        |
| (Group) Keyword-semantic/<br>Traditional | 8102.778  | 1   | 8102.778 | 36.834 | p=.000 |
| Error                                    | 29257.541 | 133 | 219.982  |        |        |

|                              |           |     |           |         |                |
|------------------------------|-----------|-----|-----------|---------|----------------|
| Within groups                | 33872.363 | 135 |           |         |                |
| (Measure) Pretest – Posttest | 19019.497 | 1   | 19019.497 | 182.884 | <i>p</i> =.000 |
| Group * Measure              | 1021.200  | 1   | 1021.200  | 9.819   | <i>p</i> =.002 |
| Error                        | 13831.666 | 133 | 103.997   |         |                |
| Total                        | 71232.682 | 269 |           |         |                |

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Dr. Buğra ZENGİN

Ataturk University

Dilmer 25240

Erzurum - Turkey

Office tel: 90 442 2314293

Home tel: 90 442 2347989

Email address:

Second Author: Assoc. Dr. Ali Riza Erdogan

Ataturk University

Faculty of Medicine

Department of Anatomy

25240

Erzurum - Turkey

Office tel: 2361212 - 2757

Home tel: 90 442 2313339

Email address:

Third Author: Assistant Prof. Dr. Suna Akalın

Ataturk University

Faculty of Education

Department of ELT

25240

Office tel: 442 2314240

Email address: