

Original Paper

Teaching English Vocabulary with Greek or Latin Roots to Iranian EFL Students by PLS Sequential Structures

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Abstract

PLS is a newly developed language teaching method which predominantly applies imaginative and random usage of pictures. The present paper explains and reports the application of a PLS technique in teaching English vocabulary with Greek or Latin roots to Iranian EFL learners. A pretest-posttest control-group design was used to investigate the effects of this sequential structures technique. Participants were intermediate level EFL students in two branches of the same language institute in Tehran (N = 94, $p \leq 0.05$). The subjects were randomly assigned into two groups of treatment and control. The experiment lasted for seven one-hour lessons held in successive sessions in three weeks during which 35 Greek and Latin roots were taught with at least three English word examples. For the research instrument, the students were administered a 35-item multiple-choice vocabulary exam for the pre and post tests prior to and immediately after the teaching phase. Consequently, an independent sample T-test was used to examine the outcome of the experiment. At $p = .009$, the statistical test revealed a significant difference in the gain scores between the two groups. Also, the mean vocabulary gain score of 7.23 for the treatment group as opposed to the mean of 5.35 for the control group illustrated the relative more L2 vocabulary intake for the treatment group.

Keywords

English vocabulary, Greek/Latin roots, imaginative, pictures, PLS

1. Introduction

Learning L2 vocabulary is doubtlessly an essential component in foreign language learning. The English language has been historically influenced significantly by Latin and Greek languages. There are numerous modern English words which are either directly borrowed from these two languages, or else have a segment driven from them. Thus, learning about this etymologically first word (the root)

can be of great importance, especially because of the power it provides the L2 learners by which they can guess the meaning of several words they see or hear for the first time. Nevertheless, to the best knowledge of the author, there has not been an exclusive study as to how to teach vocabulary with Greek or Latin roots in EFL/ESL contexts. There are, however, many interesting courses and lesson plans on the Internet such as “*Engaging activities for Greek & Latin Roots*”, and “*Complete List of Root Words*”. There are also several substantial dictionaries or thesauri on this topic, such as Danner (2014).

The present study reports an experiment in which L2 learners are taught Greek and Latin roots with several related examples. It will be illustrated that by implementing the PLS sequential structures, language learners will be able to associate various range of meanings to different words, and by doing so store them in their L2 vocabulary repertoire more effectively.

2. Literature Review

2.1 Teaching English Vocabulary in Retrospect

There is a rich and substantial literature on the English vocabulary teaching/ learning trends among various methods and approaches in the field such as (Brown, 2000; Celce-Murcia, 2001; Larsen-Freeman & Anderson, 2011; Nunan, 2003; Richards & Renandya, 2002; Richards & Rodgers, 1990; Smith, 1996; Zimmerman, 1997). For instance, students generally make use of bilingual word lists in the Grammar Translation Method. In GTM, the target language is viewed as a tool for the mind to practice with. Hence, the etymologies of the words are typically emphasized and studied. In the Direct Method, on the other hand, oral skills have been given priority over the written ones. So, pictures and teacher’s gestures are used to teach concrete words, whereas abstract words are taught based on the topics in hand. In the Audio-Lingual Method, words are chosen based on their being simple or familiar to the learners. Selection of new words in ALM is somehow limited due to the need of fitting them in appropriate drills. Furthermore, teachers in both DM and ALM are not allowed to translate words. Then, Communicative Language Teaching emphasizes communication and the ability to use the language functionally. According to Zimmerman (1997), learning vocabulary is a pivotal activity for every L2 learner. Likewise, Laufer (1998) states that vocabulary is an essential constituent of fluency in speech. Also, according to Nation (1990), vocabulary is probably the most essential element in learning a language. Nation suggests word-frequency counts as a good measure to choose the vocabulary to teach because they can help teachers and course designers develop a criterion as to which words are more useful and which ones are not frequently used. Finally, according to Schmitt (2008), learning vocabulary is a fundamental part of mastering a second language, and that L2 learners and teachers, as well as decision makers must take this fact into consideration.

From another perspective, Smith (1996) postulates that people have “working” and - perhaps- “non-working” vocabulary. This notion can also be referred to as “passive” and “active” vocabulary. By “passive vocabulary” we mean those words that one can easily understand and comprehend when

receiving the linguistic information. This often happens when somebody is listening or reading. Then, “active vocabulary” covers those words which we use when producing linguistic messages via speaking and/or writing. It is clear that normally the number of one’s passive vocabulary outstands his/her active vocabulary by far. Therefore, an essential task for both teachers and L2 learners would be to transfer the passive vocabulary to the active ones. In this regard, Shirban Sasi (2020) reports activating Taiwanese university students’ passive vocabulary substantially by prompting their imagination when using random picture combinations. Likewise, experimenting with Malaysian elementary school students, Shirban Sasi (2019) postulates that asking imaginative questions enables the teacher to inspire the L2 learners to insert the new chunks of information (for instance, vocabulary) into their previous schematic repertoire.

Nonetheless, perhaps among all the methods and approaches, Suggestopedia boasts to teach more vocabulary in each session. It is claimed that the focal point of each unit is a dialogue of about 1,200 words accompanied by a list of vocabulary and grammatical content list (Richards & Rodgers, 1990). Then as to the quality of the vocabulary, we can think of different aspects such as the frequency, degree of difficulty, degree of formality, coverage, usage, etymology, etc. of the words, each of which could be a good subject for a research (Hashim & Hassan, 2006; Smith, 1996). Moreover, we can consider types of lexical relations in a specific language like synonymy, antonymy, hyponymy, homophony, homonymy, and polysemy (Palmer, 1981; Yule, 2017). Yet, another conceivable classification of words that exist in any language can be the dichotomy of concrete vs. abstract vocabulary. To sum up, it is wise to assume that the knowledge of the above-mentioned associations within different L1 and L2 words intralingually, as well as the relations among different components of the mother tongue and the target language interlingually, such as the existence of cognates, or the language of instruction would be of great importance.

2.2 Which Method/Technique to Choose?

There have been various studies on strategies, techniques, or approaches used in teaching/learning English vocabulary such as usage of keywords: correlating the L2 word with an L1 keyword which is acoustically or orthographically alike, and by doing so, linking the L1 keyword with the L1 translation of the L2 word (Brown & Perry, 1991), semantic and thematic clustering (Tinkham, 1997), role of pedagogical tasks and form-focused instruction (De la Fuente, 2006), usage of word pairs (Webb, 2009), reading thematically related texts (Paribakht & Wesche, 1999), incidental vocabulary learning (Wode, 1999), intentional vocabulary learning (Brown, 2010), rote rehearsal vs. context/keyword methods (Rodriguez & Sadoski, 2000), input-based and production-based instruction (Shintani, 2011), use of categorical lists (Hoshino, 2010), explicit instruction of vocabulary (Mizumoto & Takeuchi, 2009), code-mixing: the use of L1 word in an L2 utterance (Celik, 2003), semantic transfer (Jiang, 2004), focus on Knowledge of affixes and morphological awareness (Noprianto & Purnawarman, 2019; Sarfraz, Tariq, & Abbas, 2018), spontaneous vocabulary reactivation (Meara, 2005), rote memorization, that is to memorize the L1 translation of a new L2 term; as opposed to semantic mapping that is to

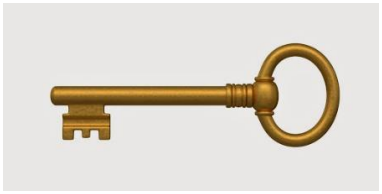
show the L1 words conceptually linked to the L2 word in a chart (Sagarra & Alba, 2006); and finally, using multiple strategies simultaneously, (Nosidlak, 2013). Additionally, many studies have shown that new words in EFL/ESL setting can be stored and retrieved more efficiently by stronger association load (Chen & Chung, 2008; Hulstijn, 2001; Keating, 2008; Mizumoto & Takeuchi, 2009; Schmitt, 2008).

2.3 What is PLS Sequential Structures?

PLS or Pictologics is a newly developed language teaching method which primarily relies on imaginative usage of pictures. The pictures used in this method do not need to be very special. They include simple photos of people, places, animals, plants, tools, food, etc. Pictures are used randomly in this method, and there are numerous techniques as to how to handle them (for more information on PLS Method please read the relevant journal articles and books which are mostly accessible on the Internet.)

Making sequential structures is a technique in which a certain word is not introduced/defined to the L2 learners immediately. Whereas, using imagination, the language instructor encourages the learners to associate different connections directly and/or indirectly to a picture (or pictures) picked randomly. In the case of the current study, several English vocabularies with Greek or Latin roots are attributed to the picture(s). The process involves creating at least two consecutive structures. Students are stimulated to produce as many structures as possible, and to try to prolong the whole sentence configuration. This technique can be applied both orally and in written forms. Table 1 illustrates an example in which a random picture is used to introduce five Greek/Latin roots and their corresponding English vocabulary. Please also see Appendix A for more examples.

Table 1. Some Latin/Greek Roots, Their Related English Words, and the Picture Used

Lat./G. Root	Meaning	Word Example	Picture Used
anthro	mankind	anthropology	
anti	opposite	antibody	
bibli	book	bibliophile	
chrome	color	chromium	
chron	time	chronometer	

As can be seen in the following lines, each English word is introduced in stages. There are virtually no limits to the kind of structures and their quantity, as there are no limits to our imagination. In some cases, the certain word might be introduced in the first structure, and then reinforced by the structures which follow.

Sentence sequence 1:

- 1- Some people lose their home keys frequently.
- 2- Psychology allows us to study their behavior as to why they lose their keys.

3- A few scholars believe that psychology is a sub-branch of **anthropology**.

Sentence sequence 2:

1- Lab research is the key to find answers to our big questions.

2- Medicine particularly depends on lab research a lot.

3- A good example is the developing and production of various **antibodies**.

Sentence sequence 3:

1- My friend lives in a very big house.

2- This is the key to my friend's house.

3- My friend's largest room is his library.

4- He keeps thousands of books there.

5- My friend is truly a **bibliophile**.

Sentence sequence 4:

1- This key is made of metal.

2- It's been plated by **chromium** for beauty and more endurance.

Sentence sequence 5:

1- Punctuality is one of the keys to success nowadays.

2- To be on time, we must rely on some devices.

3- For example, a **chronometer** measures the passage of time.

Totally 35 Latin or Greek roots were used in the present study. For each root, at least three corresponding English vocabulary were taught. Appendix B lists these roots and the related English vocabulary.

3. Methodology

3.1 Research Goal

The aim of the data collected in this pre-test and post-test control-group study was to examine whether or not teaching Greek and Latin roots to EFL students via Pictologics method is practical and effective, as compared to using conventional teaching methods.

3.2 Subjects

Totally, 94 EFL students in two branches of the same language institute in Tehran participated in the present study. They were randomly assigned into two groups: treatment (46 students), and control (48 students). Each group comprised of students who studied in two intermediate level classes in the same branch. The majority of these L2 learners were either senior high school or college freshmen students (age 15-20). As for their English language proficiency level, they either had already passed the elementary and pre-intermediate levels in the same language institute, or else had passed the entry oral and written placement tests. There were 20-26 students in each classroom.

3.3 Procedure

The present study was conducted pertinent to the restricted syllabi of the language institute, and as

complementary lessons to enrich students' English vocabulary. Two teachers of approximately the same experience taught the two groups. The treatment group received the lessons based on the PLS sequential structures technique; whereas, the control group received the lessons in a conventional way in which the teacher introduced and used each root and the related English words in just a single sentence or unrelated sentences. Both groups were allowed to use their mother tongue if needed. The total time allocation to the teaching process was seven one-hour lessons held in consecutive sessions in three weeks.

3.4 Instrument

As mentioned before, 35 Greek and Latin roots were taught each of which was introduced at least with three examples. Accordingly, the author made a 35-item multiple-choice vocabulary test for the pre and post exams (Appendix C). As for the type of the questions in the test, definition style items were used. The rationale for adopting such format was that this type of questions has been used in many websites which teach English vocabulary online. It is also the way most dictionaries use to give the denotative meanings of each word. Likewise, Susanti, Tokunaga, Nishikawa and Obari (2017) introduce several language practitioners worldwide who have used this type of vocabulary tests, sometimes referred to as the "gloss". Additionally, in order to minimize the memory effect, the test items and the choices were randomized in the two tests.

3.5 Research Question and Hypotheses

Based on the objective of the current experiment, the following research question and null hypothesis and directional hypothesis were formed.

1- Is there any significant difference between the gain scores achieved by the Iranian EFL students who learnt Greek and Latin roots via PLS sequential structures, and those who learnt them via the conventional method?

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4. Data Analysis

In the present study, the gain scores were calculated by subtracting the pre-test vocabulary grades from the post ones for each individual student. Furthermore, the normality of the gain scores for each group had been checked prior to the group comparison. Subsequently, as illustrated in Tables 2 and 3, a Shapiro-Wilk's test ($p > .05$) (Razali & Wah, 2011) and a visual inspection of the histograms, and normal Q-Q plots showed that the vocabulary gained scores of both treatment and control groups were approximately normally distributed, with a skewness of -.484 (SE = .35, and z-value = -1.38) and a kurtosis of 1.22 (SE = .688, and z-value = 1.77) for the Treatment group; and skewness of -.151 (SE = .343, and z-value = -.44) and a kurtosis of -.494 (SE = .674, and z-value = -.73) for the Control group (Cramer & Howitt, 2004; Doane & Seward, 2011). The reported values prove the relatively high

normality for both groups.

Table 2. Descriptive Statistics for Each of the Two Groups

Learners			Statistic	Std. Error
Gained Scores	Treatment	Mean	7.2391	.51657
		Median	8.0000	
		Variance	12.275	
		Std. Deviation	3.50355	
		Minimum	-3.00	
		Maximum	16.00	
		Skewness	-.484	.350
		Kurtosis	1.220	.688
	Control	Mean	5.3542	.48055
		Median	6.0000	
		Variance	11.085	
		Std. Deviation	3.32936	
		Minimum	-3.00	
		Maximum	12.00	
		Skewness	-.151	.343
		Kurtosis	-.494	.674

Table 3. Tests of Normality for Each of the Two Groups

Learners		Kolmogorov-Smirnov			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Gained Scores	Treatment	.125	46	.069	.966	46	.198
	Control	.119	48	.089	.961	48	.111

Then, as the parametric statistics used in the present study was an independent samples t-test, then three assumptions of independence of observations, normality of the scores distribution, and homogeneity of the variances needed to be met. As mentioned before, the treatment and control students were randomly assigned into two different groups. In addition, the two teachers were not informed about the other group's lesson plans. Therefore, the independence of observations has been fully observed in this design.

Moreover, concerning the normality of the distribution of the gain scores for both groups together, we should look at the descriptive statistics results as shown in Table 4.

Table 4. Descriptive Statistics for the Gain Scores

Scores	Mean		Statistic	Std. Error
			6.2766	.36377
95% Confidence Interval for Mean		Lower Bound	5.5542	
		Upper Bound	6.9990	
5% Trimmed Mean			6.3191	
Median			7.0000	
Skewness			-.248	.249
Kurtosis			.113	.493

Table 4 shows that the mean of 6.27 is very close to the median of 7.00 in both groups. We can also look at the skewness value in which we can see that the skewness of -.248 is small as compared to the standard error of .249, so the skewness is not a problem here. Also, the kurtosis value of .113 is smaller than the standard error of .493 showing that kurtosis is not a problem here, either.

Additionally, the Shapiro-Wilk test of normality gives us a significant value of .127 which is larger than the cut-off p value of .05 suggesting that the distribution of gain scores is normal.

Then in order to determine if the assumption of the homogeneity of the variances has been met, we must inspect the results of the independent samples t-test as shown in Table 5.

Table 5. Independent Samples Test for the Gain Scores

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Scores	Equal variances assumed	.149	.701	2.675	92	.009	1.88496	.70476	.48525	3.28468
	Equal variances not assumed			2.672	91.196	.009	1.88496	.70553	.48355	3.28638

In Table 5, the significance value of the Levene's Test is .701 which is greater than .05. This means that the assumption of homogeneity of the variances of the scores for this test has been met. Thus, we should use the first line in the table, which refers to "equal variances assumed".

The hypothesis being explored, the effect size statistics can also be calculated. This measure provides us with an indication of the magnitude of the differences between the two groups. A typical method to do this is to compute the eta squared. Because SPSS does not provide eta squared values for t-tests, we

should do the calculations on our own using the information provided in the output. The procedure for calculating and interpreting eta squared is by using the following formula as described by Pallant (2005):

$$Eta\ Squared = \frac{t^2}{t^2 + (N - 1)}$$

$$Eta\ squared = \frac{2.675^2}{2.675^2 + (46 + 48 - 2)} = .072$$

5. Results

As illustrated in Table 5, in the current test we have $t(92) = 2.675, p = .009$

As the $p = .009$ is less than the required cut-off value of .05, the null hypothesis is rejected and we can conclude that there is a statistically significant difference in the Greek and Latin roots gain score between the control and treatment groups. Furthermore, as for the direction of the difference, we saw in Table 2 that the mean vocabulary gain score of 7.23 for the treatment group is larger than the mean vocabulary gain score of 5.35 for the control group. Therefore, we can conclude that those students who were taught with the PLS sequential structures have higher vocabulary gain score than those who were under the conventional method.

Additionally, the effect size has been calculated at .072. According to Cohen (1988), the guidelines for interpreting this value are: .01=small effect, .06=moderate effect, .14=large effect. Thus, we would claim that the effect size of .072 for this test is rather a moderate effect. Then, if we multiply this value by 100, we can have the percentage, suggesting that approximately 7 percent of the variance in vocabulary gain score is explained by the two different teaching methods.

6. Discussion

The present study showed that involving L2 learners in using imaginative association of English words with Greek or Latin roots in a series of structures can be more effective than a conventional method in enhancing students' English vocabulary intake. These findings are in tandem with the study of Sarfraz, Tariq and Abbas (2018) in which morphological awareness was proven effective in improving students' English in a Pakistani university. Moreover, regarding the way the PLS sequential structures is applied, we might rightfully assume that this effect is somewhat similar to what is reported in studies like (Chen & Chung, 2008; Keating, 2008; Mizumoto & Takeuchi, 2009; Schmitt, 2008) in that stronger association load can improve the storage and retrieval of L2 vocabulary in EFL/ESL contexts. These meaningful associations/connections might be reminiscent of 'schematic knowledge', and in this sense, the findings of the present study support that of Shirban Sasi (2019)'s research in which Malaysian elementary school students were taught to use imaginative questions in order to add (or reform) the new chunks of information into their earlier schematic word storage. Furthermore, the current study supports the results of the experiment by Tinkham (1997) in that semantic clustering makes learning

the vocabulary more difficult, while thematic clustering serves as a facilitator of new language vocabulary learning. Likewise, the findings of the current study are in tandem with Hennings (2000)'s assertion in that L2 learners learn clusters of words rather than one word when they analyze, sort and search for related words instead of memorizing their definitions. The findings of the current study also agree with Shirban Sasi (2020)'s report in which Taiwanese university students' passive words were activated and reactivated by instigating their imagination by using random picture combinations.

From another perspective, that a teacher or student can imaginatively associate series of structures while intentionally using certain words (or phrases) can be viewed under the topic of critical thinking. More precisely, in applying PLS sequential structures, at least two traits of recognition of different causes of a problem (various plausible associations), and selection among alternatives with the use of a methodic reasoning (the seemingly unrelated structures to be thought of and related to one another) are frequently practiced. These two are among the critical thinking skills supported by many researchers such as (Angeli & Valanides, 2009; Glassner & Schwarz, 2007; Nakagawa, 2011; Popil, 2011).

7. Conclusion

The findings of the current study illustrated that students in the treatment group under PLS sequential structures technique learnt the English words with Greek or Latin roots more effectively relative to the control group. The author presumes that learning a foreign or second language can be an enjoyable process if the students believe they are capable of producing seemingly unrelated thoughts and pieces of language. The challenge itself is an effective instigator. Thus, the author suggests that applying this PLS technique, alone or in conjunction with the already existing conventional techniques and methods be considered by L2 teachers and students.

8. Recommendations for Further Research

In light of the data presented in the current article, the author wishes to suggest the following topics for further research:

- Investigating application of PLS sequential structure technique in enhancing EFL/ESL learners' listening comprehension skill;
- Exploring application of PLS sequential structure technique in enhancing EFL/ESL learners' speaking skill;
- Examining this technique in teaching/learning other languages.

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Appendix A. Some more Examples of Imaginative Usage of Pictures in Associating Words in Sentence Sequences

Lat./G. Root	Meaning	Word Example	Picture Used
pathy	feeling	sympathize	
phil	like	philosophy	
phobia	fear	acrophobia	
post	after	postgraduate	
scope	seeing	stethoscope	
sequ	follow	consequence	

Sentence sequence 1:

- 1- A jockey fell down during the horse race last summer.
- 2- He broke his leg.
- 3- His friends came to see him in order to **sympathize** with him.

Sentence sequence 2:

- 1- Any idea about the Trojan Horse mentioned in Iliad?
- 2- Iliad was created by Homer.
- 3- Homer was a great Greek poet.
- 4- Greece was also the homeland of ancient **philosophy**.

Sentence sequence 3:

- 1- Mike suffers from **acrophobia**.
- 2- Yet, this has never prevented him from horse riding.

Sentence sequence 4:


- 1- My aunt is a **postgraduate** student.
- 2- She is majoring in animal bio-technology.
- 3- She is currently conducting a research on mammals.

Sentence sequence 5:

- 1- Vets and doctors use some similar medical devices.
- 2- Both normally carry a **stethoscope**.

Sentence sequence 6:

- 1- Many people bet on horses in horse races.
- 2- To bet is a kind of gambling.
- 3- Gambling is not a good way to earn your living.
- 4- You should expect wicked **consequences** if you gamble.

Lat./G. Root	Meaning	Word Example	Picture Used
cosm	world	cosmonaut	
cycle	circle	encyclopedia	
dict	say	dictate	
duct	lead	conductor	
geo	earth	geography	
gram	write	gramophone	

Sentence sequence 1:

- 1- The earth is full of beauty.
- 2- **Cosmonauts** can see the earth from outer space. They can surely appreciate it there better.

Sentence sequence 2:

- 1- This island is located in the tropical zone.
- 2- There are variety of different kinds of weather in the world.
- 3- One can refer to a good **encyclopedia** to know more about various climates.

Sentence sequence 3:

- 1- Once upon a time, a cruel king ruled on this island.
- 2- He was so selfish that he always **dictated** everything to his people.

Sentence sequence 4:


- 1- A lot of trees grow on this island.
- 2- Wood comes from the trees.
- 3- Wood is not a **conductor** of electricity.

Sentence sequence 5:

- 1- An island is a piece of land which is surrounded by water.
- 2- I learnt this in my **geography** class.

Sentence sequence 6:

- 1- My grandfather liked listening to the music of the waves.
- 2- He had some nice records of this kind of music.
- 3- He often listened to them on his old **gramophone**.

Lat./G. Root	Meaning	Word Example	Picture Used
hetero	different	heterogeneous	
hydro	water	hydraulic	
logy	study	archaeology	
man	hand	manufacture	
mania	insanity	kleptomaniac	
matri	mother	maternal	

Sentence sequence 1:

- 1- Many owls live in forests.
- 2- You can find various kinds of animals in jungles.
- 3- They are all **heterogeneous** as far as size is concerned.

Sentence sequence 2:

- 1- Last week my friend and I went on a picnic in this forest.
- 2- We drove my cousin's car which had **hydraulic** controls.

Sentence sequence 3:

- 1- Owls are usually found in old ruins or cemeteries.
- 2- Old places are where **archaeology** is truly practiced in the field.

Sentence sequence 4:


- 1- We really have to protect our jungles.
- 2- The raw materials of many things that we **manufacture** come from jungles.

Sentence sequence 5:

- 1- In stories, crows are notorious of being **kleptomaniac** animals.
- 2- Some people also suffer from kleptomania.

Sentence sequence 6:

- 1- **Maternal** love is instinctive.
- 2- Animals also show maternal care towards their offsprings.

Lat./G. Root	Meaning	Word Example	Picture Used
socio	society	sociable	
soph	wisdom	sophisticated	
sphere	like a sphere	atmosphere	
techno	science	technology	
tele	far	television	
theo	God	monotheistic	

Sentence sequence 1:

- 1- These people live away from modern societies.
- 2- However, they are very **sociable**.

Sentence sequence 2:

- 1- These two live in a tribe in a remote place in the Far East.
- 2- For them, even fulfilling the basic needs seem to be **sophisticated** issues.

Sentence sequence 3:

- 1- Tibet is called "The Roof of the World".
- 2- Do remember to take enough equipment with you if you are planning to go there.
- 3- High places like that have a thin **atmosphere**.

Sentence sequence 4:

- 1- People who live in remote places have many obstacles to overcome.
- 2- They do not normally have access to the modern **technology**.

Sentence sequence 5:

- 1- I know which tribe these people belong to.
- 2- I have watched a **television** documentary film about them.

Sentence sequence 6:

- 1- In some countries, people worship idols.
- 2- In some other countries, people worship only one God.
- 3- Worshipping just one God means being **monotheistic**.

Appendix B. The Latin/Greek Roots and Their Corresponding English Vocabulary Taught in the Present Study

Root	Meaning	Examples
anthro	mankind	anthropoid, anthropology, misanthropist
anti	against	antibody, antiseptic, anti-aircraft
bibli	book	Bible, bibliography, bibliophile
chrome	color	chromatic, chromium, chromosome
chron	time	chronically, chronology, chronometer
cycle	circle	bicycle, Cyclops, encyclopedia
form	shape	format, formative, information
geo	earth	geography, geology, geometry
hetero	different	heterodox, heterogeneous, heterosexual
homo	same	homogeneous, homophone, homosexual
hydro	water	hydraulics, hydrocarbon, hydrogen
hyper	extensive	hyperactive, hypersensitive, hyperventilation
logy	study	archaeology, pharmacology, sociology
mal	wrong	malfunction, malignant, malnutrition
man	hand	manual, manufacture, manuscript
mania	crazy	bibliomania, kleptomania, maniac
matri	mother	maternal, maternity, matriarch
medi	middle	mediate, mediocre, medium
mega	large	megaphone, megalithic, mega-city
mono	one	monopoly, monorail, monosyllabic
multi	many	multimedia, multiply, multitude
omni	all	omnipotent, omniscient, omnivorous

patri	father	paternal, paternity, patriarch
pathy	feeling	empathy, sympathy, sympathetic
phobia	fear	acrophobia, claustrophobia, hydrophobia
post	after	postscript, postgraduate, postmodernism
scope	seeing	microscope, stethoscope, telescope
sequ	follow	consequence, sequence, sequential
tele	far	telecommunication, telephone, telescope
thermos	heat	thermodynamic, thermostat, thermocouple
trans	across	transaction, transfer, transform
ultra	beyond	ultrasensitive, ultra-speed, ultraviolet
voc	call	vocalist, vocalize, vocal cords
xeno	foreigner	xenograft, xenomorph, xenophobia
zoa	animal	zoo, zooarchaeology, zoology

Appendix C. The Vocabulary Exam for the Pre and Post Tests

1- A medical device for listening to someone's heart or breathing

- a) thermometer
- b) hospital
- c) stethoscope
- d) barometer

2- Sending and receiving messages from a distance by cable, telephone, or broadcasting

- a) telecommunication
- b) interpretation
- c) interjection
- d) falsification

3- A very strange form, or an alien creature

- a) morphology
- b) xenomorph
- c) morpheme
- d) allomorph

4- The exclusive control of the supply of or trade in a business or service

- a) duopoly
- b) polygon
- c) polytheism
- d) monopoly

5- The arrangement of events or dates in the order of their happening

- a) sociology
- b) scientology
- c) chronology
- d) biology

6- Relating to the state when someone or something is starting to develop

- a) narrative
- b) formative
- c) relative
- d) causative

7- Preventing the growth of disease-causing microorganisms

- a) anti-aircraft
- b) anticoagulant
- c) antiseptic
- d) antiterrorist

- 8- A person who collects or has a great interest in books
a) bibliophile c) xenophile
b) anglophile d) cinephile
- 9- The science of studying the physical structure of the earth, and its history
a) anthropology c) geology
b) psychology d) astrology
- 10- Evil in nature or effect
a) pregnant c) indignant
b) assonant d) malignant
- 11- Relating to prehistoric monuments made of or containing large stones
a) politic c) arithmetic
b) megalithic d) cosmetic
- 12- The male head of a family or tribe
a) matriarch c) patriarch
b) oligarch d) pentarch
- 13- The extreme or irrational fear of small or enclosed places
a) xenophobia c) claustrophobia
b) arachnophobia d) hydrophobia
- 14- Relating to or produced by color
a) chromatic c) fantastic
b) nomadic d) idyllic
- 15- Diverse in character or content
a) homogeneous c) indigenous
b) heterogeneous d) xenogeneous
- 16- A member of a race of savage one-eyed giants
a) Slipslops c) Flipflops
b) Megaflops d) Cyclops
- 17- The branch of technology concerned with the usage of liquids through pipes and channels, particularly as a source of mechanical force or control
a) hydrogen c) hydrolysis
b) hydraulics d) hydrophone
- 18- An animal or a person that eats a variety of food including meat and plants
a) carnivorous c) frugivorous
b) herbivorous d) omnivorous

- 19- An additional statement at the end of a letter, after the signature
- a) postwar
 - b) postage
 - c) postscript
 - d) postpone
- 20- The scientific enquiry that studies remains of animals from ancient places
- a) ethno-archaeology
 - b) zoo-archaeology
 - c) forensic archaeology
 - d) aerial archaeology
- 21- Forming or following in a logical order
- a) impartial
 - b) sequential
 - c) potential
 - d) essential
- 22- Extremely or extraordinarily sensitive
- a) ultraviolet
 - b) radiosensitive
 - c) photosensitive
 - d) ultrasensitive
- 23- Two or more words having the same pronunciation but different meanings, or spelling
- a) homophones
 - b) homographs
 - c) heterographs
 - d) heterophones
- 24- The branch of medicine concerned with the production, uses, and effects of drugs
- a) psychology
 - b) terminology
 - c) pharmacology
 - d) sociology
- 25- Breathing too quickly and causing too much oxygen to enter the blood
- a) hyperventilation
 - b) hypertension
 - c) hyper activation
 - d) hyper carbonation
- 26- The period during pregnancy and shortly after childbirth
- a) activity
 - b) maternity
 - c) paternity
 - d) fraternity
- 27- Make a sound or speak a word
- a) normalize
 - b) oxidize
 - c) vocalize
 - d) tantalize
- 28- The branch of physics that deals with the relations between heat and other forms of energy
- a) astrophysics
 - b) aerodynamics
 - c) electrostatics
 - d) thermodynamics
- 29- A person who is not able to resist the temptation to steal things
- a) bibliomaniac
 - b) phonomaniac
 - c) kleptomaniac
 - d) megalomaniac
- 30- A person who dislikes humankind and avoids human society
- a) misanthropist
 - b) anthropologist
 - c) anthologist
 - d) philanthropist

31- The act of buying or selling something

- | | |
|----------------|----------------|
| a) interaction | c) translation |
| b) deduction | d) transaction |

32- Of only average quality; not so good

- | | |
|-------------|-------------|
| a) medieval | c) medical |
| b) mediate | d) mediocre |

33- A large number of people or things

- | | |
|--------------|-------------|
| a) multitude | c) military |
| b) millipede | d) miracle |

34- Making goods on a large scale by using machinery

- | | |
|----------------|----------------|
| a) mandatory | c) malfunction |
| b) manufacture | d) marinade |

35- Feeling, or expressing understanding and compassion

- | | |
|----------------|--------------|
| a) symbolic | c) symmetric |
| b) sympathetic | d) symphonic |