Can the students in an ESP course learn new vocabulary as they review and practice it by playing a computer game?

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Abstract

This paper explores the use of a computer game to enhance second-language learner's knowledge of technical vocabulary in their field of study. The aim of the study is to prove that an effective educational tool for learning vocabulary does not necessarily have to present the target words in context or in a communicative way. This tool is not only innovative and entertaining but it also unquestionably reinforces the internalization of target lexical items by means of rote learning. The participants were eight fifth-year students of the Nursing major at the Universidad de Costa Rica in 2004 who were taking *English for Nurses*.

Key words: computer games, language acquisition, learning, ESP courses, English for Nursing, alternative techniques for teaching vocabulary

Resumen

Este estudio investiga el uso de un juego de cómputo para mejorar el conocimiento de los estudiantes acerca de vocabulario técnico en su área de estudio. El propósito del estudio es probar que una técnica educativa y efectiva para el aprendizaje de vocabulario no necesariamente tiene que presentar las palabras en contexto o en una manera comunicativa. La técnica utilizada no es solo innovadora y entretenida, sino que también incuestionablemente refuerza la internalización del vocabulario por medio del aprendizaje de repetición. Los participantes fueron ocho estudiantes del último semestre de Enfermería en la Universidad de Costa Rica en el 2004 quienes llevaban el curso *Inglés para Enfermeras*.

Palabras clave: juegos de cómputo, adquisición de una lengua, aprendizaje, cursos de ESP, inglés para enfermería, técnicas alternativas para la enseñanza de vocabulario

Every single day, educators all around the world engage in an endless search for new and more effective techniques to help students in their learning process. Regardless of the field of study, most teachers devote a considerable amount of time and effort in such endeavor. For the ones who teach a foreign language, this task is quite a challenge because they have to either concentrate on one (or few) of the linguistic components of the target language (i.e. morphology, syntax, phonology, semantics, pragmatics or lexicon) or attempt to cover all of them. If they choose the latter option, they might not be able to achieve the target objectives due to the complexity that it implies to successfully address all the components at once. If they choose to focus on one or a couple of the components, chances are that the goals will become more feasible.

The present paper aims to explore a new technique to enhance the pupil's knowledge of a linguistic component: lexicon. In this case, the learning experience developed for teaching technical vocabulary items consists of a computer game designed by an English professor. The inclusion of technical and semi-technical vocabulary is one of the pillars of any English for Specific Purposes (ESP) course. In order to conduct the study, a group of eight fifth-year students in the nursing major at the Universidad de Costa Rica (UCR) was selected as the target population.

ESP students need to be able to understand and use technical vocabulary in their work. As a result, those who considerably broaden their lexicon are likely to accomplish their daily tasks more successfully. Nowadays, professionals of various majors have the motivation to use a second language effectively in order to respond to society demands such as performing their job adequately, providing quality service, coping with new trends and adjustments, and exceeding their personal goals.

Since methodologies for second language acquisition must constantly adapt to world changes, scholars find it crucial to look for innovative and more useful techniques to respond to pupils' requirements. In fact, vocabulary has become one the linguistic areas that requires and deserves more thoughtful consideration in order to implement new contributions. This investigation provides the reader with a novel option that guarantees the automatic internalization of linguistic items. Furthermore, this technique can be put into practice by the students with relative ease and outside of the classroom, which promotes independent/autonomous learning strategies.

Even though contemporary communicative trends in language learning suggest that vocabulary should be taught and practiced through meaningful interaction for desirable outcomes, alternative exercises can be implemented with similar results. In this case, the use of a technique that relies on rote learning is examined to determine its effectiveness. Indeed, an enjoyable didactic activity, like the computer game created for this purpose, encourages people to dedicate more time to practice and reinforce the contents presented in class. Therefore, the following question arises: Can the students in an ESP course learn new vocabulary items as they review and practice them by playing a computer game which does not use meaningful interaction?

Review of literature

Vocabulary acquisition is increasingly viewed as crucial to language acquisition. Coady and Huckin (1997) review studies which assert that students feel words are very important and they are eager to learn them. Moreover, Dudley-Evans and Jo St John (2003) emphasize that storage and retrieval of vocabulary are the most necessary sources of input for production purposes. They recommend various techniques such as the use of word association, mnemonic devices and visual images to help remember a word. These authors also state that ESP teachers need to check that learners have understood technical vocabulary that is essential to carry out an exercise. Likewise, Chamot and her colleagues (1999) suggest the strategy of *grouping,* which consists of the organization of vocabulary in specific fields. They state that this strategy allows the students to focus on learning the new vocabulary. Furthermore, Schmitt and McCarthy (1997) say that in order to learn a new word, learners must recognize it and enter it into their mental lexicon. They also conclude that short-term representation and rehearsal allow the eventual establishment of long-term sequence information for language.

According to Christison (2002), whose contributions to language learning through brain-based research are highly rated, there are four pathways to retrieve information from our brain: procedural, episodic, semantic and sensory. First, procedural memory takes place when someone accesses information guided by a sequence of events that are automatically carried out when a person follows a protocol (e.g. driving). Episodic memory refers to the impact that meaningful events have in our learning processes and/or lives, and how they help us recall key information quite easily (e.g. remembering something due to an embarrassing experience). Semantic memory accounts for the incorporation of new concepts and rules into paradigms that have been already established in the brain (e.g. the use of nouns as subjects in sentences). Sensory memory explains how we internalize information that our body receives by means of our five senses and how the excessive amount of input causes the brain to let go most of that information (e.g. listening the names of thirty students and just recalling a couple of them). In fact, the example that illustrates how sensory memory works is somehow related to what Corder (1967) refers to as intake, as it is opposed to input (in Scarcella and Oxford, 1992). The latter researchers address such phenomenon as they state that whereas input is all the stimuli that is provided to the student, intake is merely what the subject is able to internalize.

As a matter of fact, every language learner has eventually witnessed how common it is for him or her to forget (in a short term) vocabulary items that he/she just learned in a language lesson. Consequently, learning vocabulary can easily become a very difficult task if the students are not provided with multiple word encounters. This implies that showing a new word to the students and explaining its meaning is not enough for them to incorporate such word into their long-term memory.

Providing one's students with several word encounters is one of the best ways to turn input into intake. For such purpose, it is necessary to present the

new vocabulary to the learners several times. This follows the premise that the more they see and use a word the better the chances that they will learn it. This principle is addressed by Hutchinson and Waters (1996) who assert that it is not enough for learners to have the necessary knowledge but they must use it; as a result, students need to organize the information into a meaningful network of knowledge.

Moreover, Nation (1990) and Cohen (1987) recommend the use of rote memorization as one of the best techniques to provide learners with word encounters to language teachers. Even though such technique is not as highly rated as guessing meaning form context or morphological word analysis, researchers acknowledge its pedagogical value since memorization provides a foundation for the deeper understanding that follows at a later time when the language is used. Then, this is the way to develop automaticity of language, which later results in language production. Furthermore, from their teaching experience, teachers have noticed how enthusiastic students are about practicing language by means of games. Many researchers have argued that games are not just time-filling activities but have a great educational value (Uberman,1998). "Games can lower anxiety, thus making the acquisition of input more likely" (Richard-Amato, 1988, p. 147). They also enable learners to acquire new experiences within a foreign language, which are not always possible during a typical lesson. In fact, games are a valuable way of practicing language since they provide a model of what learners will use the language for in real life in the future.

As a novel technique to learn ESP vocabulary, computer games have been used to motivate students to practice the language in a more engaging way. As an illustration, Herselman (2000) explored the role computer games can play in providing learning opportunities for resource-deprived students. He found out that after exposure to the games as individuals and in groups, ESL proficiency of the learners showed great improvement. In short, learners definitely benefit from the medium of computer games that provide practice for vocabulary internalization.

Method

Subjects

The participants in the study were all the students of the ESP course *English for Nurses*. Such group consisted of eight female pupils, whose ages ranged from twenty-two to twenty-four years-old. By the time the study was conducted, these learners were enrolled in the courses of the final (tenth) semester of nursing major at UCR. Moreover, they were about to defend their thesis project for the Licenciatura degree. As a matter of fact, the main reason that motivated most of them to take the ESP course is the fact that they had the chance to work in the United States after graduation.

Each pupil's English proficiency level was determined by an interview and a written test, which were elaborated and conducted/administered by the three student-teachers from the UCR Master's Program in TESOL who team taught the ESP course. In both evaluations, the members of the group obtained very similar results. In general terms, all the participants were ranked as beginners in writing and as intermediate in the other three communicative skills: listening, speaking and reading. Nevertheless, the level of two pupils was evidently a little higher than rest.

The course *English for Nurses* was designed to prepare the students to carry out the tasks inherent to their profession in an English-speaking country. For example, those tasks required them to exchange and/or record information in English (i.e. a hospital or clinic in an English speaking country, or any health institution in a Spanish-speaking country in which they have to orally interact with English-speaking patients and their relatives).

Instruments

Three instruments were employed in order to carry out this research project: a computer game called "Vocabulary" designed and programmed by one of the student-teachers, a language test to determine each participant's mastery of vocabulary items, and a questionnaire to find out about the amount of time that the students invested playing the game (see appendixes 1 and 2).
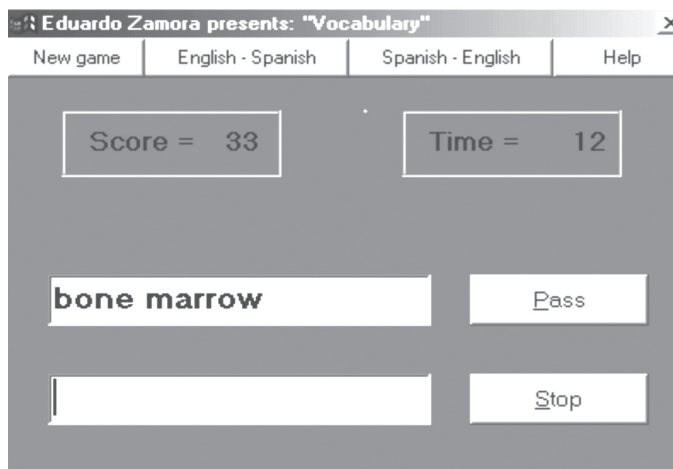
Figure 1
Game "Vocabulary"

Figure 1 shows the layout of the computer game "Vocabulary". The objective of the game was to translate key vocabulary either from English to Spanish or from Spanish to English. All the key words included in the game are nouns that correspond to parts of the human body. The player can select the mode she wants to play with the buttons in the menu (i.e. translating from English to Spanish or vice versa). Once the participant has selected the mode to play, the upper textbox will display a word (e.g. bone marrow). Then, the player's job was to translate that word in the other textbox, the one located at the bottom. When the players translated the word correctly, the game automatically gave them a point and displayed a new word in the upper textbox. If they did not know the meaning of any given word or the correct translation they could always click on the "pass" button and the game would display a new word (though the player would lose a point). Immediately after a player clicked on the "pass" button, the game showed a label with the correct translation of the word the student passed.

In order to make the game enticing and more challenging (and hopefully motivate the pupils to play time after time), two features were incorporated: a set of eleven levels and a clock that determines the time allotted to reach the next level.

The features mentioned above worked as follows: In each level, the players were given a specific number of seconds to get five points. In order to do so, they needed to translate five words; however, every time they passed on a word, they had to translate an extra one (as a penalty) in order to reach the next level. In other words, if a player clicked the "pass" button once in a given level, she had to translate six words to reach the next level; if she clicked it twice, then it took seven words and so on. When the "pass" button was not clicked, only five words were required to move along.

The levels did not have different words because there are no priorities when it comes to learning this vocabulary. The aspect that distinguished each level was the time allotted to get five points. Thus, in the first level, the player was given sixty seconds to get five points; and every time a new level was reached, the player had five seconds deduced from the time allotted. E.g. the player had fifty-five seconds to complete level two, fifty seconds for level three, and so on. The game was over when the player was able to get fifty-five points; that is, when she finished level eleven. In order to do so, at least fifty-five words had to be translated.

Every time the game ended, no matter if the player won or lost, the upper textbox showed the date and time. When that happened, the player had the chance to record her performance by writing her name in the other textbox. (See figure 2.)

Finally, in order to increase the participant's motivation to play the game, the student-teachers promised to give extra points for the final grade to a pupil every time she showed that she had scored more than fifty points. A simple way to show the score consisted of "printing" the screen and pasting the image in a word document, just as a learner did with Figure 2.

Figure 2
A student wins the game
and saves it for extra credit
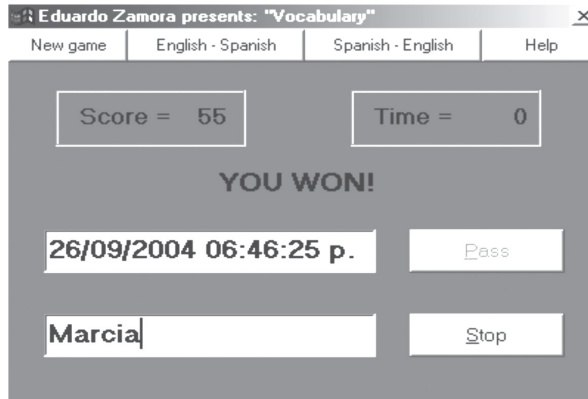
The second instrument is the language test (appendix 1). The test was origi- nally conformed by two sections: one focused on vocabulary while the other did on collocations. The section that dealt with collocations required the participants to fill blanks with the verb "be", "feel" or "have" before a given symptom or ail- ment. This part of the test was not taken into consideration in order to narrow the present study.

The first part of the test focused basically on one dimension of the lexicon: its meaning. As a result, the main purpose for such instrument was to find out if the participants knew the meaning of key vocabulary items. Every word in- cluded in the language test refers to a part of the human body (e.g. heart, leg, mouth, etc); therefore, they all fall under the category of common concrete nouns (see appendix 1).

Due to the fact that all the vocabulary items included in the game and the language test are common concrete nouns that name the various parts of the body, there was no need to pay attention to other dimensions of the vocabulary such as its morphology, syntax or collocation in utterances. For instance, it was not necessary to look at the morphology of the words because none of them is the result of an inflectional or derivational transformation (as in "work" with "worked" and "worker", respectively); instead, all those words exist in English just because of arbitrariness[1]. In regards to the syntax and collocations of the vocabulary items, there was no need to assess the participants' proficiency in those aspects due to the fact that their distribution in their native and target language are very much alike (basically as subjects or objects in sentences, e.g. "His knee is dislocated", "Su rodilla está dislocada", "She hit her head", "Se gol- peó su cabeza").

The researcher considered that the best way to asses whether the partici- pants knew the meaning of the key vocabulary items was to have them translate such words. As a result, the learners' task in the language test was to translate

a set of 63 words. The words were provided in Spanish, and the learners were asked to write the English counterpart. Students were not given the words in English to translate to Spanish in order to avoid guessing.

Finally, the pupils were asked to answer a questionnaire (see appendix 2). This questionnaire was designed mainly to find out how much time each person had invested playing the game and the highest scores they were able to obtain. Moreover, it also inquired about reasons that either motivated or prevented them from playing the game, as well as their opinion about the game as a tool for learning English vocabulary. Participants had the chance to answer the questions in Spanish in order to provide more detailed responses.

Procedures

Five steps were followed to conduct this research project. First of all, the learners were taught the vocabulary. This took place during class time as they performed tasks that nurses carry out in real life, such as filling out physical exam forms and nursing histories. Then, the students reinforced the vocabulary with several activities during class. The vocabulary was presented and practiced in both written and oral forms.

The following step was to administer the language test. Right after the students handed in the language test, the game was presented with a demonstration about how to play it. Also in the same class session, each participant received a copy of the game in a diskette.

The learners had five weeks to play the game. Each student decided on the amount of time they wanted to dedicate to this activity. Unfortunately, it was not possible to have all participants play the game on a regular basis because it would have been necessary to have a computer laboratory available all the time. Therefore, the motivation to play the game was completely intrinsic. As a matter of fact, part of the rationale for this study was also to investigate if the game was enticing enough to motivate the learners to spend part of their free time to play it.

After the five-week period had passed, the learners' mastery of the target vocabulary needed to be measured again. Thus, the language test was administered to the participants. It was decided to use the same test for a second time in order to guarantee an accurate comparison of the pupils' proficiency level before and after engaging in the learning experience that was to play the computer game.

The final step was to administer the questionnaire.

Results and analysis

The first interesting result obtained in this study is the similarity in the participants' performance in the first language test. Not only did all of them

score between 31 and 40 points out of a total of 63, but also the majority (63% of the participants) scored 31 points (See Graph 1). This phenomenon indicates that almost all the population shared a strikingly similar background knowledge of the target items. As a matter of fact, 5 out of the 8 participants knew exactly half of the vocabulary items included in the test (31 out of 63 items), while the rest knew a similar number (i.e. 34, 38 and 40, respectively).

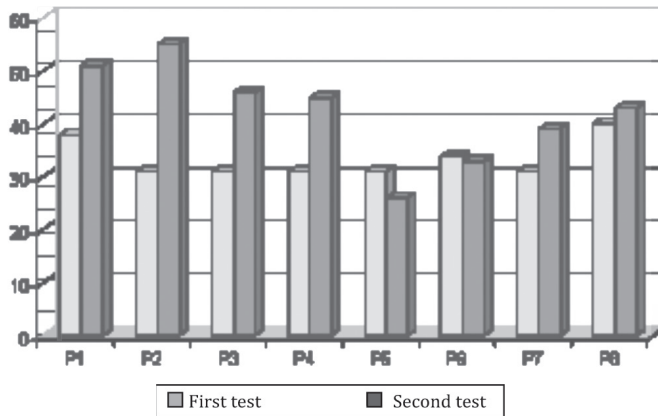**Graph 1**
Results from the first language test
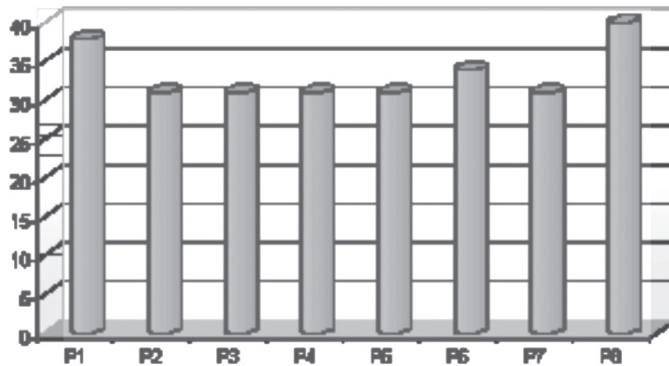
Even though the results from the first language test were highly homogeneous, the scores obtained in the second language test were not. It is hard to establish similarities in the second language test due to the fact that there are two learners whose score is above 50 points, three learners between 40 and 50, two learners between 30 and 40 and one learner below 30 (See Graph 2). The best proof of the heterogeneity in the results is the fact that the highest score (participant two with 55 points) was more than two times higher than the lowest score (participant five with 26).

Graph 2
**Results from the second language test**
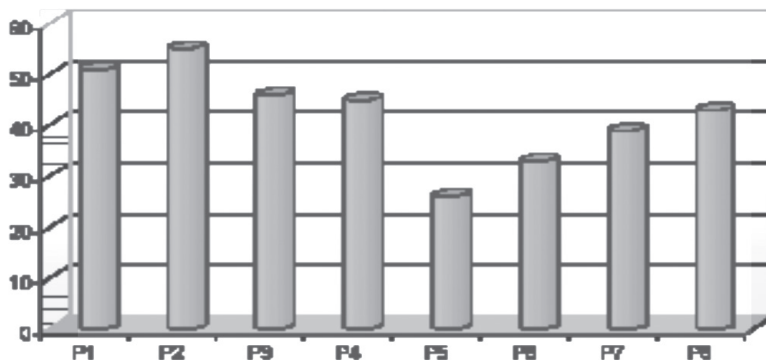
Clearly, the results in Graph 2 contrast with those in Graph 1 because the first language test suggests that the participants have a similar knowledge of the target items; nevertheless, that was not the case when the second language test was administered.

Graph 3
Comparison between both language tests

First test   Second test

Graph 3 shows the comparison between the results obtained in both language tests and Graph 4 shows the difference in the participants' performance. While the first four participants show significant improvement in their proficiency level, the other four participants do not. This issue indicates an extremely odd result due to the fact that it was expected that the computer game would help all the participants in a similar way. Consequently, two questions arise at this point: Why is there a clear difference between two groups of students? and why did two participants have a lower score in the second language test?

Graph 4
Difference between both language tests
in terms of each participant's proficiency

Students who played the game often   Students who did not play
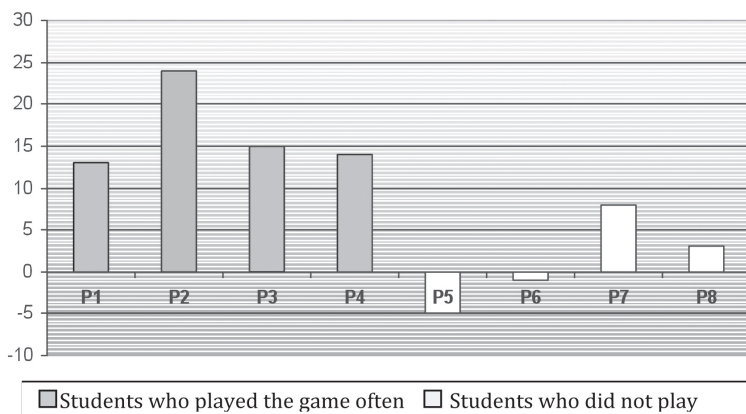
In order to find out the reason for the marked difference between the two groups, it was necessary to ponder on the factors that may be the cause for that phenomenon. The questionnaires provided an extremely important piece of information that might explain this issue.

According to the students' responses in the questionnaire, the first four participants stated that they played the game several times, at least on five occasions. In most cases, every occasion encompassed a two-hour period, as participants 1 and 2 point out. Besides, even though participant 4 just wrote that she played it five or six times, she did not mean that she played it five or six games, but five or six occasions that could have represented several games (that is deduced from the information where she accounted the highest scores she got, as she reported seven games). On the other hand, from the second group of students, participants 6, 7, and 8 reported that they only played the game on one occasion, while participant 5 played between 30 and 60 minutes during the five-week period.

Another factor that supports the belief that the first four participants devoted a considerable amount of time playing the games, as opposed to the second group, is the fact that the first four participants did remember the highest scores they obtained playing the game, while no one in the second group was able to recall such information. That information was also provided in the questionnaires.

It is also interesting that except for participant 2, whose improvement was the highest (+24), the participants from the first group showed almost the same improvement (+13, +15 and +14 points), as Graph 4 indicates. Even though the participants who score really low in the first test tend to show the greatest improvement in studies like this one, that is not the case in this study as the first four participants did similarly to the rest in the first language test.

Regarding participants 5 and 6, who scored lower in the second language test, there is an explanation for their performance. First of all, participant 6, who scored -1 point in the second test, showed a behavior that is very similar to the one experienced by participant 8 (+3), i.e. they both remained with almost the same proficiency during the study after all. On the other hand, there has to be an element that explains why the proficiency of participant 5 decreased so much. According to the ESP course attendance list, participant 5 was the student who missed the most lessons of all the subjects in this study.

Conclusions

The stated research question certainly confirms that students can learn vocabulary by playing with a computer game since the participants of this study showed evident improvement. This result demonstrates that after having more practice of word encounters, learners are able to enhance technical lexicon. Moreover, it also shows that a well-elaborated computer task motivates learners to keep practicing the language outside the classroom.

For communication purposes, students need to broaden their vocabulary to express themselves more clearly and appropriately in a wide range of situations. As a result, they need to reinforce their knowledge of the language as much as possible to succeed in their endeavors as the study concluded.

Understanding how our memory works helps educators create more effective ways to teach vocabulary. Teachers can facilitate the learning process, by grouping items of vocabulary in semantic fields as illustrated in the game design. Likewise, EFL methodologies suggest a great deal of techniques to understand, practice and use lexical items in context. Nevertheless, a rote learning exercise has equally proved to convey the same purpose. It is well-known that all learners are different, and respond differently to the variety of methods, techniques, tasks and activities that language teachers use. As a result, it is recommended to try out as many techniques as possible and evaluate how they work.

The students' motivation played a paramount role in this study. It evidently affects learners outside the classroom as much as it does inside. The students who devoted time to play the games had the motivation to do so, regardless of time constraints. Their motivation was shown in their interest for the highest scores they obtained, whereas if the other participants had been more motivated, they could have dedicated more time to play the games and also to pay more attention to how well they did (i.e. how many points they got).

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Notes

1   Arbitrariness is a linguistic property of all languages that explains that the names of words are assigned arbitrarily. E.g. the name "house" was given to the builiding where a person lives just because it had to be called something, not for a particular reason.

Appendixes

Proficiency Test for Action Research

Student_____

Please translate the following words:

Cabeza _____   Ojos _____

Oídos   _____   Boca _____

Garganta_____   Nariz _____

Espalda_____   Pecho_____

Corazón _____

Pierna _____

Tobillo _____

Rodilla _____

Hombro _____

Ortejo _____

Clavícula _____

Abdomen _____

Testículos _____

Vagina _____

Cuello _____

Diente _____

Espina dorsal _____

Arteria _____

Hueso _____

Estómago _____

Intestinos _____

Frente _____

Cintura _____

Cadera _____

Pantorrilla _____

Espinilla _____

Piel _____

Órgano _____

Víscera _____

Pulmón _____

Brazo _____

Codo _____

Talón _____

Dedo _____

Pie _____

Mano _____

Muslo _____

Pene _____

Ingle _____

Labios _____

Cráneo _____

Músculo _____

Vena _____

Pelvis _____

Hígado _____

Riñón _____

Lengua _____

Busto _____

Pies _____

Muñeca _____

Antebrazo _____

Cara _____

Tórax _____

Sangre _____

Capilar _____   Bazo _____

Articulación _____   Cerebro _____

Complete the following sentences with the verbs: "be", "have" and "feel"

He _____ constipated   You _____ exhausted

They _____ laryngitis   She _____ bleeding

He _____ a headache   We _____ bloated

I _____ nauseous   She _____ intoxicated

They _____ a fever   I _____ congested

You _____ weak   They _____faint

He _____a virus   I _____ depressed

You _____ wheezing   He _____ dizzy

We _____ cramps   You _____ vomiting

They _____ an infection   He _____ sweating

She _____ pain   You _____ diarrhea

It _____ a backache   They _____ swollen

English for Nurses

Student: _____

Please answer the following questions. You can provide your answers in Spanish or English.

1. How much time did you spend playing "Vocabulary" and/or "Collocations". Please be specific.

Vocabulary _____
_____
_____

Collocations _____
_____
_____

2. Which were the highest scores you got in each game. Mention how many times you got them.

Vocabulary: _____ points _____ times   Collocations: _____ points _____ times
Vocabulary: _____ points _____ times   Collocations: _____ points _____ times
Vocabulary: _____ points _____ times   Collocations: _____ points _____ times

3. What motivated you to play the games? What prevented you from playing the games?
_____
_____

4. Do you think Vocabulary can help students improve their English proficiency? Why?
_____

5. Do you think Collocations can help students improve their English proficiency? Why?
_____

6. What would you change in the vocabulary game to make a better learning tool? Why?
_____

7. What would you change in the collocations game to make a better learning tool? Why?
_____