Building English Vocabulary Schema Retention
Using Review Value Calculation for ESL Students

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Abstract

Vocabularies, the core of any language, are probably the most challenging and time-consuming part of learning a foreign language in a diverse and disperse community of learners. This study proposes an approach that can help a learner build up his/her English vocabulary volume by intensive article reading, inclusion of Google Cloud Natural Language API, Glosbe Dictionary API and the use of a computing technology, the review value calculation. The review value calculation was able to determine the number of days the new words should be reviewed so as to become part of long-term memory. This paper shows that students were able to increase their vocabulary acquisition skills by applying technology and computing to their study routines. Students were able to retain words fast and understand their usage better, by employing an interactive monitoring process. If the system is used properly and implemented carefully, it will hypothetically produce a faster technique for acquiring new vocabularies for foreign students.

Keywords: *vocabulary schema, review value calculation, short-term memory, long-term memory, assessment interval*

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Introduction

The unimaginably vast growth of information, communication technologies and the increase of students' knowledge of computer learning have paved the way for new educational forms, known as e-learning (Georgiev et al., 2004). Commonly known as computer-based training, then termed internet and Learning Management Systems, e-learning has become the latest term used to address the search for new and more effective educational methods. E-learning has been used to help students learn the English language in their own convenient time and place (Kritikou, 2013). Learners do not regard e-learning as a replacement for traditional instructor-led training but as an accompaniment to it, leading to a blended-learning strategy (Ruiz et al., 2006).

University language learners studying English as additional subject, not a major one, still have problems in acquiring vocabulary. The assumption is that this might be due to the strategies used in teaching vocabulary. Thus, language teachers and researchers started considering technology as an option to teach this more effectively. (Levine, Ferenz & Reves, 2000; Horst, Cobb & Nicolae , 2005; Tozcu & Coady. 2004; Taylor 2009). It seems that learners show very little effort in dealing with their problems with newly learned words when technology is involved. During the lesson, teachers often assume that students will deal with this problem of vocabulary-building outside the class on their own. However, learners do not have enough knowledge about vocabulary learning techniques, and they have difficulty in dealing with this problem themselves (Monica, 2014).

Offering online lessons to students with the use of video-conference systems has become a large industry. The rapid growth of this demand led the way to industries offering online lessons to students by means of video-conference systems.

Video-conferencing fosters communication and collaboration (Johnson et al., 2006), and trainee-teachers can jointly dissect the newly acquired knowledge (Hu & Wong, 2006). Some researchers conclude that video-conferencing is a "powerful tool" to give students confidence in innovative teaching practices. Kent and Simpson (2010) stated that students have viewed video-conferencing mostly as an alternative way for learning English outside the classroom. In fact, and not just for English language learning according to Georgiev et al., (2004), no matter how huge the advantage of direct learning is, once the student has no ability to be part of the that particular lesson in that particular time, s/he will miss the training material. Moreover, Kent and Simpson (2010), see it as a new system that can bring knowledge in an updated form. In this system, the teacher will teach the learner new vocabulary words that are within the lesson for the day. Usually, there is no

systematic way of doing this; it would just be based on the teacher's prerogative. Vocabulary is one of the critical skills of the English language. Allwright, in his paper, "Language Learning through Communication Practice" stated that communication is essentially the result of language teaching; nevertheless, its importance as a component of the language teaching process has been neglected. He further suggested that recalibrating language teaching towards a major focus on communicative skills encompasses three fundamental elements, namely: samples of the target language, guidance concerning the nature of the target language and management or directed learning activities. Clearly it all leads down to focus on enhancing learning through its roots. Since educators, lecturers, teachers and even the learners themselves place priority on grammar and reading skills, the core of learning the language – vocabulary – is overlooked. They immediately forget the words after the teacher has given them the meaning or even after looking in the dictionary. A number of studies have investigated how students can improve their vocabulary, with reading being one of the most common ways to do so. A long-term habit of extensively reading articles that are appropriate for a learner's English ability can greatly improve the vocabulary and command of a learner of English (Song, 2000). However, this strategy may be difficult to implement for a learner with no extensive vocabulary, because the learner may have problems either in choosing appropriate levels of articles in accordance with her/his needs and interests or in figuring out the meaning of unknown words using the semantics of familiar words in an article that is obtained. Dictionaries are always helpful; however, the need to continually look up unknown words, which once learned may be forgotten in a few days as per learning curve theory, might also easily discourage a learner. According to Atkinson (2009), several researchers have also developed language tutoring systems in order to assist learners in learning language and proposed different personalization strategies for personalized e-learning systems. With regard to an e-learning system, it is also hard to select appropriate articles for such learners if precise profiles of learners are never established.

This study proposes an approach that can help a learner build up his/her English vocabulary volume by intensive article reading, during which meanings of unknown words are understood in the context of articles, followed with a handful of checkpoints to assess the learner and with the use of review value calculation to determine vocabulary memory retention. The intention is to obtain the vocabulary from articles more effectively, so learners will not easily forget the words.

Vocabulary learning is an area in which learners use learning strategies most frequently (Klapper, 2008). Kilickaya and Krajka (2010); a number of strategies are required to empower the process of vocabulary teaching and learning with the aid of technology. When second-language learners use particular approaches for acquisition of new words in the second language, these are defined as vocabulary learning strategies (GU, 1994). Oxford (1990) defines vocabulary learning strategies as "operations employed by the learner to aid the acquisition, storage, retrieval and use of information". Vocabulary learning has been classified into two forms: the traditional vocabulary and technology-savvy vocabulary learning (Schmitt & Schmitt, 1995). In traditional vocabulary learning, vocabulary lists that enhance students' memories and understanding of the words are used. However, it is impossible to compile a vocabulary list that is appropriate for all the students in a class with different English levels (Graham, Harris & Loynachan, 1993). Some researchers used a keyword method as the best memory technique for learning concrete words, but not abstract words (Stroller and Grabe, 1993). Others suggest that the use of a vocabulary notebook and/or index cards can be an effective shortcut to achieve this (Schmitt & Schmitt, 1995). Ideally, the words recorded in the notebook and or index cards are chosen according to the needs of individual learners, thus learner autonomy is raised. With the increase in learner independence, its effectiveness has been widely recognized. Sahin (2009) and some other researchers (Kilinc et.al, 2018; Ritter et. al, 2011; Tarman,; 2017; 2016; Tarman, Baytak, & Duman, 2015; Tarman & Baytak, 2012; Valiandes & Tarman, 2011) reiterated that the use of technology in pedagogy has proven its valuable contribution. Another known vocabulary learning strategy is semantic mapping; this is a popular strategy used in classrooms. Learners are encouraged to use concepts and relationships to create a semantic map in which keywords are highlighted. Linkage is formed between the previously learnt information and the new word so as to reinforce and retain the memory of the new word. According to Nation (1990), researchers have made both positive and negative comments regarding this method, and semantic mapping's ability to meet the learners' vocabulary needs is still questionable (Nation, 1990).

The role of vocabulary acquisition in learning has been recognized by researchers in the field (Schmitt 1997, Neilsen 2003, Dornyei & Skehan, 2003 and Craven 2013). It is also interesting to note that both traditional and technology-savvy techniques are worthy of mention. However, there is still a need to address and develop new innovative ways to improve learning in vocabulary

acquisition using a deterministic peer review calculation that deals with word retention and acquisition.

Vocabulary Architecture

Figure 1 shows the English vocabulary schema-building processes, which are composed of four phases: assessment phase, practicing phase, vocabulary acquisition phase, and the actual acquisition phase. During the assessment phase, the level and interest of the learner will be initially assessed to create the learner's vocabulary schema, profiles and a personalized learning process. After the establishment of the interests and level of the student (based on standards created by the Common European Framework of Reference for Languages), the system is capable of rendering 25 – 40 articles, depending on the information taken during the initial assessment. As the learning process progresses, short quizzes will be given based on the learner's vocabulary schema to determine the learner's comprehension.

On the other hand, the practicing phase is capable of helping learners through speaking with human native English speakers, subject to the availability of online instructor(s). Usually, learners will request an online instructor for actual mentoring and tutoring. Results will then be recorded for profiling the learner's vocabulary schema. When the user requests to speak to a native speaker, the system will find a teacher that is available at that time in the system. The native speaker will then be given enough time to review the student's level and vocabulary schema before speaking to the student.

Meanwhile, the vocabulary acquisition phase is a stage where an article will be presented based on the learner's level, interest and profiles. The article is directly linked to the Google Cloud Natural Language Application Programming Interface (API) to determine parts of speech and grammar rules, lemmatization and stemming, while the instructor defines vocabularies that need to be learned by the learners. The actual acquisition stage defines the meaning of the vocabulary words, employing Glosbe Dictionary API to define the vocabulary according to the localized definition of words and language conversion from one language to another, e. g. English to Spanish, and to other recognized languages. In the learning process and the acquisition of new words, the review value calculation will dynamically be computed to determine reinforcement (reading related articles) and adjustment (quizzes) to make sure that new word items will be learned. The higher the value of the review value calculation, the higher the memory retention. There are four essential tables that will keep track of the progress and assessment of the learner:

the learner's portfolio table, learner's vocabulary schema table, general vocabulary table and article table. These tables will contain all of the learner's information such as interest, level and articles, which will be saved automatically. This is where the Review Value Calculation module will obtain all the information before giving the user the appropriate articles to read, vocabulary to use in the articles, and quizzes to give.

Review Value Calculation

To determine the acquisition of new vocabulary, short-term and long–term items should be determined using the concept of review value calculation or RVC. Short-term items refer to any newly obtained vocabulary in the system. When a user obtains a new vocabulary item, it will be marked as short-term by default. Each newly obtained vocabulary item is ranked as 1 in the user's vocabulary schema, and as it continues appearing in the quizzes, its rank increases. Regarding the short-term memory on the learner's vocabulary schema, the system will compute the Assessment interval or Ai as shown in the equation below. The lower the rank of the word, the more it will appear in assessment, so the learner can master that particular word. However, if the learner has reached rank 4 on that particular vocabulary item - which would mean that it is now a long-term item - it will be counted as short-term and will be tested along the process.
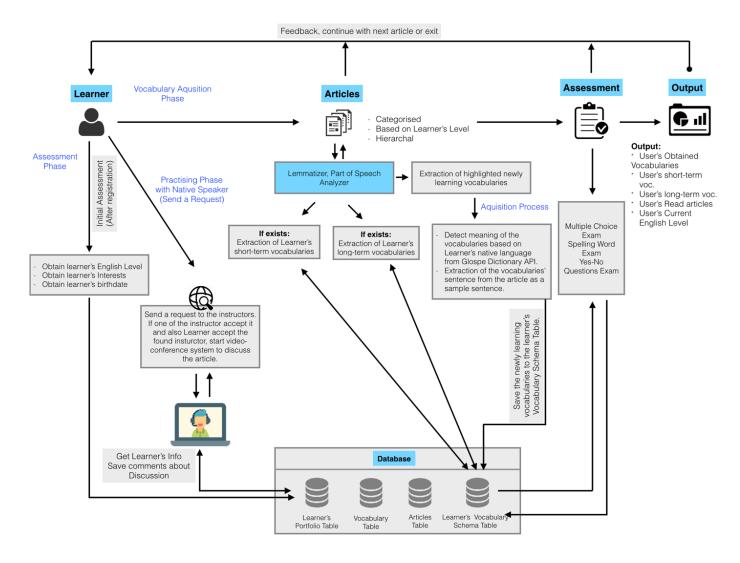
Figure 1: The Vocabulary Learning Processes of the System

$$Ai = \bigl(round(0.5 * rc) + (2 * sp) + (2 * riec)\bigr) * rg$$

where:

Ai=assessment interval

rc = review_counter

sp = speaking_practice

riec = review_in_exam_counter

rg = ranking

Given a real-time example, assume all the variables are given a default value of 1 except ranking (rg), which is 4, then Ai is:

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$$= (\text{round } (0.50 * 1) + (2 * 1) + (2 * 3)) * 4$$
$$= (1 + (2 + 6) * 4$$
$$= \ 9 * 4$$
$$= \ 36$$

The assessment interval Ai is computed in terms of days. The next assessment for that particular vocabulary item is in 36 days. A quiz containing that word would then appear and if the learner gets it correct, a new assessment interval would then be computed, and it could appear, depending on the system's calculation, in a month, a year or so. Nevertheless, after a 36-day interval and assessment takes place, if the user gets the word wrong, it would be degraded again into a short-term item.

Method

This chapter presents the research design, respondents, sampling technique, data gathering instrument, preparation of the instrument, validation of the instrument, method used in the developing system, data gathering procedure, retrieval of the instrument and statistical too. This method designed to gather information about the condition of the existing study. The proponent used one of the types of descriptive research; the Descriptive comparative study which is suited for the proposed study. This is comparative survey where the proponent considered at least two entities and established criteria to determine which between existing and proposed system are better.

Research Design[SEP]

This study used Developmental research and descriptive research methods to understand how to be proposed system was analyzed.

Natural work environments are the ideal place for development research. Given the ambiance of research, it makes way for a greater reliability of any particular research thus creating

methodological predicaments for the proponent. However, the research is considered best if it is done in an actual place than of simulated or idealized projects only. For instance, Klein and Richey (2005) involved tests on two real-time projects pertaining to design and development of a company. These tests include stand-up training whereas the other had computer-based training. Giving the idea of "real life" concept of development-based research renders the results longer than expected comparing from the other kind of research. Frequent changes in one's research timeline and processes leading to unexpected events which is quite normal in other kind of research. Eventually, it is safer to say that fully-detailed research procedures and time frame are two important things to take into account.

The software model that advocate utilized is the Agile Development Model; infer a precise, methodology to the product advancement that starts at the framework stage and phases.
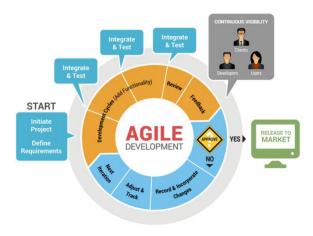

Figure 2: Agile Methodology

In software developmental application, a particular method is used in creative process that expects the usage for flexibility and carrying out a level of pragmatism to the finished product, Agile Software Development (ASD). It focuses on making the code simple, running a test often, and once ready it delivers functional bits of the application. The main aim of ASD is to provide and build progress within small client-approved parts, for it is usually the preferred norm than delivering the whole large application by the end of the project.

Moreover, Agile, fosters the platform of evaluating the heading of the task at hand throughout the advancement lifecycle. The usage of sprints or emphases which is also known as customary

rhythms of work are applied at the end of advancement lifecycle process wherein introduction of possibly shippable item is enhanced. "Iterative" and "incremental" are the dexterous portrayed procedure - this is yield when the process is concentrated on the redundancy of curtailed work cycles. Improvement sets have only one chance of opportunity to measure every part rightfully. Taking about the lithe standard, each and every part of improvements such as online, prerequisites and the others are simultaneously returned to the advancement lifecycle. At any instance a group stops and a reassessment happens, it could render a guide to an alternate bearing.

The outcomes of this "inspect-and-adapt" methodology to advancement extraordinarily decrease both improvement expenses and time to market. Since groups can create programming in the meantime they're assembling necessities, the marvel known as "investigation loss of motion" is less inclined to block a group from making advancement. Furthermore, on the grounds that a collaboration cycle is restricted to two weeks, it gives stakeholders repeating chances to align discharges for achievement in this present reality. Nimble improvement system helps organizations construct the right item.

Population and Study Participants

This is a case study for United Towers - ISpeakBetter Company. This study will be integrated in our existing system. The respondents of this study will come from our existing data from our website's (ispeakbetter.com) database who are willing to participate.

These respondents will be in different levels when it comes to their English proficiency. Some have already tried learning English using a web-based program and some would be their first time. In addition to that, the respondents will come from different countries such as Azerbaijan, Germany, Indonesia, Mongolia and Turkey thus their exposure to English would also differ.

Data Collection

The researcher will get its necessary data from the system's database – contains the users' feedback and gathered information.

The respondents will be given enough time to go through the whole process. The process itself will not be time constrained since students will be in a different level in their English skills.

As soon as the respondents complete the whole process of trying the system online, the researcher will gather all the results and will be tallied and tabulated. These data will become the basis of the analysis and interpretation. It will take 6 months to gather the data from system's database.

Data Collection Tools

Throughout the process of doing a comprehensive study until the moment of writing this paper, the researcher found out that this study has not been done before in any field of learning English as a Second Language (ESL).

There are existing platforms and sites which are thoroughly discussed in the Review of Related Literature section, yet, none of these works mentioned, are emphasizing enough in developing one's speaking and reading skills by improving his vocabulary schema through an interactive e-learning communication with review value calculation.

The searcher has designed the system for experimental use, thus prototype of this system has been produced. The engagement and the feedback taken from the learner throughout the process will be the main source in considering this a success. At the end of the day, there will always be room for improvements.

Data Analysis

Part of carrying out good research is rendering intended results. These results can be gained through an authentic and comprehensive research testing. This study believes that engaging the respondents more productively is possible when the following framework of testing are taken into account.

 - Functionality
 - Reliability
 - Accessibility
 - Efficiency in terms of creating vocabulary schema, tracking the user's status and progress

The monitoring of the individual progress of the user in terms of his/her vocabulary schema is taken into account. It includes the number of gained short-term and long-term vocabulary words. For instance, out of 67 newly acquired vocabulary words, 10 were already known to be long-term

while the rest will still be in the short-term category, thus will be seen in upcoming articles more frequently. The vocabulary item, figure of speech and its translation are all shown to serve just like a dictionary, and contain all its vocabulary schema. Learners can easily track their own progress with a click at their convenience.

Findings and Discussion

For brevity, figures and tables have been restructured; only 20 out of 50 learners have been used for discussion. A total of 50 students were extracted from 1000 possible learners served by the company.

The participants' English levels are almost the same, considering their age and nationalities. This may be attributed to less exposure to the English language in these countries. The development process of vocabulary schema was divided into three parts, namely: will-be-obtained, newly obtained and obtained vocabulary words.

As much as the front-end of the system, design, is taken into account, review value calculation algorithm implementation is another major component in providing the learners' vocabulary schema. This is done by considering the back-end formula used in finding the assessment of the interval. The assessment interval defines the schedule as to when that particular vocabulary item should appear in a quiz. In order to compute the assessment interval, the components include the performance during exams, the number of times the items appeared and whether the learner conducted a speaking practice with the lecturer online.

For the discussion, student number 2 was taken as an example. Applying the formula discussed in the previous section, Table 3 derived the attributes of vocabulary id 62, and the assessment interval of the vocabulary item will be assessed after four days. Looking at the created entry, this shows when the vocabulary item was first seen, and if it appears in other articles it will be updated. However, based on the assessment interval, if the particular word was created last 2017-11-29, a quiz will be given to the learner four days later (2017-12-03) regarding the vocabulary item.

This approach was actually seen in the General English Proficiency Test, GEPT, in Taiwan as early as 2000. The same vocabulary and articles are used in different levels of the GEPT for different levels of English ability. In addition to adjusting the memory cycles of vocabulary (Wang, 2012), it also determined the relationships between words in an article and intelligently adjusted the memory cycles of those words that do not appear in the after-reading quizzes but are known to

a learner. This approach not only enhances the learner's vocabulary schema but also checks the learnt word from time-to-time with the assessment interval.

Table 1
Users' profile and initial assessment result

#	Name	Family Name	Initial Level	Vocabulary Area	Age	User's Native Lang.
1	Kubilay		A2	Adventure	34	Turkish
2	Numan		A1	Adventure	42	Turkish
3	Mücella		A2	Adventure	20	Turkish
4	Zeynep		A1	Adventure	17	Turkish
5	Ömer		B1	Adventure	22	Turkish
6	Ahmet Turan		A2	Adventure	23	Turkish
7	Furkan		A1	Adventure	21	Turkish
8	Selman Kasim		A2	Adventure	17	Turkish
9	İbrahim		B1	Adventure	19	Turkish
10	Adalet		B1	Adventure	20	Turkish
11	Uğur		A2	Adventure	25	Turkish
12	Ahmet		A2	Adventure	26	Turkish
13	Öznur		A1	Adventure	30	Turkish
14	Яна		A1	Adventure	24	Russian
15	Barış KARSLI		A1	Adventure	22	Turkish
16	Лёша		A2	Adventure	21	Czec Rep.
17	Mustafa		A1	Adventure	19	Turkish
18	Leopoldo		B1	Adventure	33	Moldova
19	Orxan		A1	Adventure	19	Azerbaijan
20	EMRE		A2	Adventure	32	Turkish

Table 1 shows the initial level of learners from different countries doing online courses of English Communication, mostly from Turkey, Russia, the EU and Central Asia. The age average is 24.5 with standard deviation of 1.25. The area of interest that the prototype software offers is adventure with the participants' English Level ranging from A1 to B1.

Table 2
Learners' profile on target vocabulary and number of articles

#	Name	Family Name	Target Vocabulary	Vocabulary Area*	Obtained Vocabulary	User's Native Lang.	Article Level	Total Article	Finished Article
1	Kubilay		110	Adventure	78	Turkish	A2	15	10
2	Numan		100	Adventure	80	Turkish	A1	22	18
3	Mücella		110	Adventure	80	Turkish	A2	15	18
4	Zeynep		100	Adventure	50	Turkish	A1	20	10
5	Ömer		113	Adventure	45	Turkish	B1	20	7
6	Ahmet Turan		115	Adventure	45	Turkish	A2	15	8
7	Furkan		100	Adventure	45	Turkish	A1	20	12
8	Selman Kasim		115	Adventure	70	Turkish	A2	15	11
9	İbrahim		113	Adventure	50	Turkish	B1	20	7
10	Adalet		113	Adventure	60	Turkish	B1	20	9
11	Uğur		115	Adventure	70	Turkish	A2	15	13
12	Ahmet		115	Adventure	50	Turkish	A2	15	9
13	Öznur		100	Adventure	40	Turkish	A1	25	12
14	Яна		100	Adventure	40	Russian	A1	22	12
15	Barış KARSLI		100	Adventure	60	Turkish	A1	22	15
16	Лёша		115	Adventure	80	Czec Rep.	A2	22	18
17	Mustafa		100	Adventure	90	Turkish	A1	22	20
18	Leopoldo		113	Adventure	50	Moldova	B1	20	10
19	Orxan		100	Adventure	70	Azerbaijan	A1	22	17
20	EMRE		115	Adventure	60	Turkish	A2	22	11

Table 2 shows the status of the 20 learners with the corresponding records of those who were given adventure level articles. The third column corresponds to the target vocabulary or will-be-obtained vocabularies. For student number 1, for example, the requirement was to have 110 to-be-obtained

vocabulary words, but only 78 were obtained, with 10 articles rendered out of 15, etc. All these are part of showing the students' progress throughout their journey in enhancing their vocabulary schema and learning English.

Table 3:
The assessment interval of a particular student

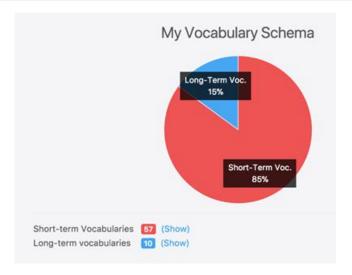| id	user_id	av_id	vocabulary_id	ranking	review_counter	review_in_exam_counter	speaking_practice_counter	assessment_interval	next_assessment_dt	created_at	updated_at
85	2	66	62	1	3	1	0	4	2017-12-03	2017-11-29 18:i:46	2017-11-29 18:i:19
87	2	65	61	1	1	1	0	3	2017-12-02	2017-11-29 18:i:46	2017-11-29 18:i:46
88	2	64	60	2	1	2	0	5	2017-12-04	2017-08-10 18:i:19	2017-11-29 18:i:19
89	2	63	59	1	1	1	1	5	2017-12-04	2017-11-29 18:i:46	2017-11-29 18:i:46
84	2	58	55	1	5	1	1	7	2017-12-06	2017-11-29 18:i:46	2017-11-29 18:i:19
86	2	57	54	2	3	2	1	8	2017-12-07	2017-08-10 18:i:19	2017-11-29 18:i:19
83	2	56	53	1	3	1	1	6	2017-12-05	2017-08-10 18:i:19	2017-11-29 18:i:46
78	2	55	52	1	2	1	1	5	2017-12-04	2017-08-10 18:i:19	2017-11-29 18:i:46
82	2	53	50	3	1	3	1	9	2017-12-08	2017-08-10 18:i:19	2017-11-29 18:i:46
81	2	52	49	1	2	1	0	4	2017-12-03	2017-08-10 18:i:19	2017-11-29 18:i:46
80	2	51	48	1	3	1	0	4	2017-12-03	2017-11-29 18:i:46	2017-11-29 18:i:46
77	2	50	47	3	1	3	0	7	2017-12-06	2017-11-29 18:i:46	2017-11-29 18:i:46
79	2	49	46	1	1	1	0	3	2017-12-02	2017-11-29 18:i:46	2017-11-29 18:i:46
76	2	48	45	1	1	1	0	3	2017-12-02	2017-11-29 18:i:46	2017-11-29 18:i:46

My Vocabulary Schema

Long-Term Voc. 15%

Short-Term Voc. 85%

Short-term Vocabularies 57 (Show)
Long-term vocabularies 10 (Show)

Figure 3. Long-Term vs. Short-Term Vocabulary

Figure 2 shows the monitoring of individual progress of the user in terms of his/her vocabulary schema. It includes the number of gained short-term and long-term vocabulary words. This graphic illustration is presented for visual clarity. Out of 67 newly acquired vocabulary words, 10 were already known to be long-term while the rest will still be in the short-term category, thus will be seen in upcoming articles more frequently. Clicking the show button in Figure 2 will show all the new vocabulary words learnt by the learner. The vocabulary item, figure of speech and its

translation are all shown to serve just like a dictionary, and contain all its vocabulary schema. Learners can easily track their own progress with a click at their convenience.

The use of review value calculation provides an essential factor to support improving the learner's vocabulary schema through the promotion of the learner from one level to another. For instance, the system can show and monitor students who make progress by increasing its level. To give an example, student 2 was able to obtain 100 new vocabulary words, and after taking a handful of quizzes, he would be promoted to A2.

This takes time and flows like a continuous process, once one has mastered the fundamentals of a language (pronunciation, orthography and basic grammar). Throughout this process, learners become familiar with the words they come across. It is the frequency of usage and the number of encounters in different forms and contexts that determine the acquisition of new vocabulary. Teaching vocabulary should not mainly focus or consist of providing new specific words to the learners, but should involve and arm them with the necessary techniques and strategies to enhance vocabulary knowledge (Craven 2013).

Furthermore, based on the study of Kilickaya & Krajka (2010), language instructors are largely unaware of the vast opportunities technology provides. The probable reason for this is the lack of training in the usage of technology in language classrooms.

Conclusion and Implications

Learning new vocabulary is one of the most challenging and time-consuming processes for foreign learners. Several researches studies have navigated this area of tutoring and successfully implemented it in different manners. The study focused on enhancing the vocabulary schema of the learner by providing reading articles based on the learner's interest and English level. To make sure that the acquisition of vocabulary will take place, a computing mechanism has been incorporated into the system using review value calculation. Through the use of the said mechanism, learners were able to monitor their progress while the system dynamically determined when a vocabulary word should be transferred into long-term memory from short-term memory. Based on the results, many foreign students were able to demonstrate faster comprehension and understanding. Almost all of the students showed an increase in their English level according to European English Level Framework. Although the study has successfully implemented computing mechanisms in word acquisition, there is a need to have an intelligent system to aid the learners to

advance in the learning process: for example, the presence of an artificial intelligence (AI) module to teach the students and encourage them to continue is needed for faster word acquisition. Another possible proposal is to transform the learning process into a game-based tutoring system.

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