

Using Web 2.0 and Corpus Technology to Enhance Vocabulary Acquisition

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Abstract

Undergraduate students are exposed to discipline-specific lexis and concepts, particularly when studying in a second language. Current research suggests that most students find it difficult to fully comprehend academic reading material because they lack the requisite vocabulary, i.e., 5,000 to 8,000 word families are required for achieving 95% to 98% comprehension, respectively. Thus, in order to enhance vocabulary acquisition and, ultimately, improve knowledge of complex discipline specific vocabulary, this study evaluated the use of the *Memrise* application as a self-directed learning tool. The study was conducted in an Arab higher education institution where undergraduate students studied IT in English. By using the *Memrise* application in conjunction with a discipline-specific key word corpus, it was anticipated that this intervention would improve vocabulary acquisition with minimal use of classroom teaching time. Results indicated that when students engaged with the learning tool there was a noticeable improvement in vocabulary knowledge for those who used the application on a regular basis. Overall, the study has implications for teachers, as well as learners, as the *Memrise* application is an adaptable and freely available mobile learning tool for developing vocabulary knowledge.

Keywords: data-driven learning; vocabulary self-collection strategy; vocabulary learning; teaching with mobile learning applications

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Introduction

The ability to read academic texts in English is one of the most challenging issues facing second language learners and, when coupled with subject-specific vocabulary, studying at English-medium institutions (EMI) can be challenging for many of the Emirati students who have previously only studied in Arabic-medium schools. Therefore, many federal EMI's in the UAE require students who have not achieved an International English Language Testing System (IELTS) score of 5.0 to attend a pre-baccalaureate program that focuses on English academic literacy and language skills.

Reading proficiency is assessed throughout these academic English courses and students are expected to have achieved a satisfactory level of academic literacy skills that will allow them to cope with the English language textbooks and the discipline-specific material encountered in their baccalaureate studies. At first glance, most students do cope and have the literacy skills to meet subject requirements. However, informal feedback from many of the content faculty suggests that students do struggle with the complex texts and subject-specific vocabulary they encounter in class. This situation stimulated several discussions within the college and prompted further investigation.

A short survey was conducted with the content faculty, asking them to identify the language difficulties their students faced in class and what strategies they used to cope with these problems. Most responses indicated that many students did, indeed, face language difficulties, particularly with the complex vocabulary they were required to learn and the ability comprehend course textbooks. Furthermore, several faculty felt that it was not their place to cater for these difficulties and that additional language support should be provided. (Internal College of Technological Innovation's Language Task Force Survey, January 2014). This initial lack of language support for content courses led to the development of a variety of research projects to look at strategies for enhancing students' academic literacy skills.

The focus of this research project was to improve vocabulary acquisition. It was hypothesized that by using contemporary text mining techniques to extract key vocabulary and by improving vocabulary acquisition through MALL (Mobile Assisted Language Learning) strategies, we will be able to reduce the difficulties faced by ESL students when studying difficult concepts and lexis in their content courses and help them develop what Vollmer calls:

“.... ‘conceptual literacy’ and ‘discourse competence’. The first of these terms can be defined as the ability to think clearly with the help of language, whereas the second means to apply linguistic abilities acquired for the purpose of communicating clearly about relevant topics and thematic structures.” (Vollmer ,2006, p.7)

In section 2 of this paper, the literature review will address the issue of developing vocabulary knowledge. Section 3 will discuss the methodology used to develop the vocabulary and, finally, Section 4 of the paper will conclude with a discussion of the results and future implications for this pilot project.

Background

Current research has demonstrated that there is a clear link between word knowledge and the ability to comprehend texts. This relationship was examined by (Nation, 2006) and more recently by (Laufer and Ravenhorst-Kalovski, 2010) who not only suggested that increased vocabulary knowledge could lead to an improvement in reading comprehension, but also proposed two thresholds for text coverage and comprehension. This showed that for a student to understand 98% of a text, knowledge of 8,000 word families is required and a knowledge of 4,000 to 5,000 word families for 95% coverage.

Studies cited by (Cobb, 2015) suggest that the first 2,000 most frequent words, coupled with the 570 word families in the Academic Word List (AWL), can bring the coverage of an academic text up to approximately 90%. The students in this pilot course were tested using the (Meara and Milton, 2003) X Lex vocabulary levels test and had an average vocabulary level of 3,500 to 4,000 words. To increase comprehension to the minimum coverage of 95% recommended above, an intervention that will increase the students' word knowledge of 4,000 to 5,000 word families will be required.

This awareness of the importance of academic vocabulary is thus deemed necessary for students to study successfully in university. Consequently, it is paramount that the content faculty be made aware of interventions that could enhance their students' comprehension of academic texts. However, as the faculty survey above revealed, many content teachers do not have the time or inclination to engage in strategies to improve their students' text comprehension. Instead, many rely on basic glossaries available in the course textbooks and assume that the students will make use of these. To rectify this situation, an intervention framework based on the Vocabulary Self-Collection Strategy (VSS+), (Haggard, 1982; and 1986, p. 204; Wolsey, Smetana and Grisham, 2015), was created. A pilot study was implemented (Dowswell, 2016), and the results were positive for those students who completed the project, however, after much reflection, it was decided to revise the framework as the VSS+ wiki activities were very labour intensive. It was at this point that the *Memrise* application was chosen as a replacement for the course vocabulary wiki.

What is Mobile Assisted Language Learning (MALL) and why was the Memrise application selected?

As previously mentioned, a computer-based intervention using a class wiki was implemented. The wiki could be easily accessed by the students on many different devices, thus, allowing them to collaborate and update the course glossary by means of the class wiki if they had Internet access. The construct behind the VSS+ wiki strategy; the Involvement Load Hypothesis (ILH) (Laufer and Hulstijn, 2001), also ensured that the students who participated retained the vocabulary they processed for longer. As they hypothesized; words processed with greater learner involvement are retained longer than those processed with a lower involvement load. The construct, labeled 'task-induced involvement', incorporated the cognitive components of 'Search' and 'Evaluation' and the motivational component of 'Need', so as long as there is a high level of engagement for each of the components, learning will take place.

There was now, however, a need to employ a more user-friendly framework that still retained the advantages of the VSS wiki framework and the ILH. As a result, the *Memrise* application (<https://www.Memrise.com/about/>) was selected. This application is basically an electronic flash card with many additional features such as; algorithms that make a note of lexis with which the students have difficulty. It can be easily personalized, with audio and pictorial additions, and even translations can be added.

Although it does not completely follow the process of task-induced involvement, when students are researching the word for uploading to *Memrise*, they are using the “Need” “Search” and “Evaluation” components. The students also have the opportunity to work online, or offline, and individually, or collaboratively, to create electronic course glossaries. The other rationale for choosing *Memrise*, was that the UAE has one of the highest adoption rates in the world for “smart devices” (GfK Consumer Index, 2016). All the students in this study had access to a smart mobile device and the *Memrise* application.

What are the criteria for vocabulary selection and how were the key words selected?

The current debate on the benefits of rich vocabulary instruction (Nagy and Townsend, 2012) as opposed to “genuine academic reading for the readers’ own purposes” (Krashen, 2012, p. 233) has prompted educators to explore what intervention would be more successful with ESL students. However, evidence provided by (Smith, 2001) showed that Arab learners find vocabulary acquisition extremely challenging, primarily because a limited number of words in English are borrowed from Arabic. Furthermore, the Arab teaching pedagogy is traditionally based on rote learning and, in most situations, there is minimal engagement in extensive reading activities. Based on this evidence, the present study employed ‘rich’ vocabulary instruction strategies in the style of the *Memrise* application, as these would be deemed more useful for Arab ESL students.

Having decided on a new method of intervention, a corpus of academic words specific to the pilot Information Technology course, *IT in Global and Local Cultures*, was used again. The use of corpora in language teaching and learning, sometimes referred to as ‘data-driven learning’, a model created by (Johns, 1990) (as cited in O’Keeffe, & McCarthy, 2010), has greatly simplified the process of analyzing language and enabled the creation of frequency lists based on the course textbook. The corpus was easily created using the *SketchEngine* application (Kilgarriff, Rychly, Smrz, & Tugwell, 2004). Once the lists were created and analyzed, the keywords were chosen based on the following criteria: the relevance to subject, (discipline specific words), the academic word list, (general academic words), and, finally, the frequency level as per the Vocab Profiler (Cobb, 2015). The rationale for this is based on the (Hiebert and Lubliner, 2008) study on academic vocabulary instruction. This suggests that academic words can be categorized into two distinctive areas: general and discipline-specific. General words are used across disciplines, whereas discipline-specific words tend to be used only in particular subject areas. It was decided to include both types, as learning discipline-specific words does not always guarantee full comprehension of discipline-specific texts.

Methodology

Research design

The aim of this research was to develop and apply a framework for the teaching and learning of content-specific vocabulary. It employed a quasi-experimental research design to test the impact of the *Memrise* application and compare the results against a control group who received normal instruction. The participants were randomly selected based on their classroom placement. The study explored the following research questions:

1. Is there a significant difference between the MALL (Mobil Assisted Language Learning) intervention group and the control group that received traditional vocabulary instruction strategies?
2. What are the IT students' perceptions of learning academic vocabulary with the *Memrise* application?

The Intervention

Participants

A total of 11 male and 42 female university students majoring in Information Technology at an EMI university in the UAE were asked to participate in the study. The students, all ESL learners with Arabic as their first language, ranged in age from 20-30 years old. A control group of 20 female students followed the traditional course of instruction. The intervention group consisted of two intact groups: one female class of 22 students and one male class of 11 students who had the option of using the *Memrise* application to reinforce vocabulary encountered in class. Of the students participating in the intervention group, 24 of the 33 students completed a pre- and post-vocabulary knowledge (VKS) test and 33 completed the questionnaire. From the control group, only 8 students completed the pre- and post-VKS test.

The intervention took place over a period of twelve weeks or six teaching units. The students in the intervention group were instructed on the use of the *Memrise* application as an autonomous learning tool. After reading the text and discussing the major concepts in class, the students who had access to the *Memrise* application could access the specific *Memrise* course (CIT 305) that contained the lexis for each new topic covered in the course. The intervention students also had the opportunity to add to the *Memrise* entries as they saw fit. As an incentive, a small percentage of the final course grade was awarded for participation based on the score on the leaderboard.

The screenshot shows the Memrise interface for the course 'CIT-305 IT in a Global Society'. At the top, there are navigation links for Home, Courses, Groups, and a Go Pro button. The course description states: 'The focus of this course is on the impact of information technology on global and local societies. Topics include: ethics principles, ethical reasoning, professional codes of ethics, benefits and risks of IT, protection of privacy, changing communications paradigms, controlling offensive material, intellectual property and the new challenges faced, crime and the difficulties of fighting crime in cyberspace.' Below the description, there are buttons for 'Levels (6)', 'Difficult words', and 'Edit Course'. A progress bar shows '0 / 144 words learned (0 in long term memory)' and '0 ignored'. A 'Learn' button is visible. On the right, a 'Leaderboard' section shows a list of users and their scores:

Rank	User	Score
1	MaryamAlm...	206,140
2	khulood_ali	169,378
3	Shahad101	150,670
4	Shaikha_Ahm.	128,554
5	MahaBlooki	91,351
6	BedoorSaleh	76,048

Below the leaderboard, five vocabulary items are listed, each with a 'Ready to learn' button and a topic name: Ethics Overview, Ethics for IT Workers, Crime, Privacy, and Intellectual Property.

Picture 1. Screenshot of Memrise Course Leaderboard and Vocabulary Item

The screenshot shows a vocabulary item for 'Code of ethics'. It includes the following elements:

- Language:** English
- Word:** Code of ethics
- English Definition:** A written set of guidelines issued by an organization to its workers and management to help them conduct their actions in accordance with its primary values and ethical standards.
- Arabic:** قانون الأخلاق
- Images:** A photograph of a wooden gavel and a pair of golden scales of justice.
- Navigation:** A 'Next' button with a right arrow icon.

Picture 2. Screenshot of Memrise Vocabulary Item

Data Collection Instruments & Procedures

All students taking the course were asked to complete a vocabulary knowledge test. The aim of the test was to establish which of the 130 corpus keywords were known by both groups of students. Additionally, at the end of the study, a questionnaire was used with the intervention group to assess the students' perceptions on the use of the *Memrise* application as an autonomous learning tool.

The vocabulary test used was an adapted version of the Vocabulary Knowledge Scale (Paribakht and Wesche, 1997) which is a test of students' knowledge of discipline specific and academic vocabulary and was based on 130 prominent key words, extracted from the discipline specific corpus. The students in this study indicated their level of recognition of the words by selecting one of the following four options:

- a) I have never seen this word before;
- b) I have seen or heard of this word before;
- c) I think I can define this word;
- d) I am confident I can define this word.

The test was completed by 24 students from the intervention group and 8 students from the control group.

The questionnaire was comprised of a total of 7 statements. Participants in the intervention group were asked to rate each statement on a 5-point Likert scale (*Agree, Strongly Agree, Neither Agree nor Disagree, Disagree, Strongly Disagree*). The questionnaire was administered at the end of the 12-week intervention and it was completed by 33 students.

Results & Discussion

Pre- and Post-Test Comparisons

The first research question sought to investigate the effect of vocabulary instruction using the *Memrise* application with the intervention group and to compare the results with a control group who had received traditional vocabulary instruction.

To investigate the effect of the *Memrise* application on vocabulary comprehension, a repeated measure ANOVA was used to compare between the mean scores of a pre-test and those of a post-test given to each group. The vocabulary used in the pre-tests and post-tests was specific to the vocabulary clusters.

For the vocabulary set, a pre-test and a post-test were given. An ANOVA test analyzed in SPSS showed a significant difference between the two tests. The means of the two tests are shown in the table below:

Table 1. Descriptive Statistics

	Mean	Std. Deviation	N
Post 1 Categories	.7917	.58823	24
Pre 1 Categories	2.8333	1.00722	24

The statistical test revealed a main effect between the two tests $F(1, 23) = 79.458$. We applied the Greenhouse-Geisser correction as the Greenhouse-Geisser estimate

of sphericity ($\epsilon = .79$)

Table 2. Tests of Within- Subjects Effects

Measure: Measure 1									
Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent Parameter	Observed Power a
Test1	Sphericity Assumed	50.021	1	50.021	79.458	.000	.776	79.458	1.000
	Greenhouse-Geisser	50.021	1.000	50.021	79.458	.000	.776	79.458	1.000
	Huynh-Feldt	50.021	1.000	50.021	79.458	.000	.776	79.458	1.000
	Lower-bound	50.021	1.000	50.021	79.458	.000	.776	79.458	1.000
Error(test1)	Sphericity Assumed	14.479	23	.630					
	Greenhouse-Geisser	14.479	23.000	.630					
	Huynh-Feldt	14.479	23.000	.630					
	Lower-bound	14.479	23.000	.630					

a. Computed using alpha = .05

Pairwise comparisons were conducted to parse out the discrepancies between pre-test and post-tests. These comparisons showed that the participants performed significantly better when tested after the end of the first vocabulary intervention.

Each subsequent set of vocabulary words followed the same pattern (a pretest, an intervention – *Memrise* – followed by a post-test) and a similar method for data analysis. The second set of vocabulary words showed a significance difference. However, the results of these indicated an opposite effect. The students performed better in the pre-test than they did in the post-test. When tested, the third set of vocabulary did not show a significant difference between the pre-test and post-test with a p value of .83. The fourth and final test showed a significant difference between the pre-test and post-test with a p value of .002.

There are several reasons why this data was inconsistent. For one, the VKS is a self-reporting test and students may not fully understand the importance of answering accurately. They also may not have encountered this type of test before as self-reporting tests are not frequently used in this context. Therefore, students may have needed more time to become accustomed to the value of self-reporting for both teachers and learners.

Questionnaire

The second research question sought to discover what the intervention group thought about the *Memrise* application as a means of learning vocabulary. A questionnaire was used asking the participants in the intervention group to rate a total of 7 statements on a 5-point Likert scale. The results of the questionnaire are shown in Table 3.

Table 3. Questionnaire results (n=33).

Statement	SD	D	N	A	SA
1. <i>Memrise</i> has been useful for vocabulary learning.	7	1	8	10	7
2. <i>Memrise</i> is a useful tool to practice new course vocabulary.	7	3	3	11	9
3. <i>Memrise</i> has given me more exposure to new vocabulary	6	1	7	10	9
4. I think my motivation to the subject has now increased.	6	2	5	16	4
5. The <i>Memrise</i> Application has improved the sense of community in the class.	5	5	9	12	2
6. <i>Memrise</i> is easy to launch and navigate.	6	2	3	13	7
7. <i>Memrise</i> motivates me to study vocabulary more often.	5	3	6	14	5
Note: SD= Strongly Disagree; D=Disagree; N=Neutral; A=Agree; SA=Strongly Agree					

The feedback gathered from the questionnaire suggested that:

- Just over 50% of the students in the intervention group found that the *Memrise* application was useful for vocabulary learning.
- While 60.6% felt that *Memrise* was a useful tool for practicing new vocabulary.
- A further 19 out of 33 students felt that *Memrise* provided them with more exposure to new vocabulary.
- Just over 60% of the students felt that their motivation increased, however, only 42% felt that it improved their sense of community in class.
- In terms of ease of use, just over 60% of the students found the application easy to launch and navigate.
- Finally, approximately 57% of students stated that *Memrise* motivated them to study vocabulary more often.

The above data would suggest that the *Memrise* application was quite useful as a vocabulary learning tool in that it provided students with the opportunity to learn vocabulary anywhere and at any time. It also provided the opportunity for them to collaborate and compete. However, as the data revealed, only 37% of the students used the application on a regular basis which was far less than expected considering that the application was interactive and not just a memorization device. Possible reasons for such a low take-up of the application could be; the very small grade incentive awarded for usage, the use of more conventional methods for learning vocabulary and, finally, the limited amount of time spent training students on the use of the application. In the future, it would be advisable to employ the application as a course glossary, created with the vocabulary discussed in class. The bulk loading

utility could be easily utilized after students added difficult vocabulary to a common Google spreadsheet.

Conclusion

The main purpose of the current study was to determine the effectiveness of the mobile learning application *Memrise*, as a means of enhancing the acquisition of content-specific vocabulary by undergraduate Arab students studying at an EMI in the UAE. Each of the research questions sought to determine the level of effectiveness of this intervention. Although the results from the first research question were not conclusive, in that students performed significantly better with respect to specific vocabulary sets than they did with others, this could be for various reasons. For example, the students self-reported their knowledge of the vocabulary words so it could be possible that they had actually seen or had not seen words and had falsely reported their responses.

The questionnaire results indicated that students who used the application found the tool to be a useful method by which to learn new vocabulary. Not all students, however, found the application engaging even though it streamlines the process of vocabulary acquisition. In a future study, it might be worth investigating the reasons for this lack of engagement in greater depth. It would also be interesting to recruit more students to do a direct comparison between paper-based and computer-based vocabulary learning strategies and the long term retention of content-specific vocabulary.

The present study has implications for both teachers and learners as the *Memrise* application could be easily adapted by content-specific teachers as a method for developing their students' vocabulary knowledge and concepts in their specialized courses. With the help of this free and readily available tool, the framework described in this paper, could be adapted to enable learners to apply many of the 21st Century learning skills such as collaborative and autonomous learning. Social networking devices such as mobile phones are now so prominent that students have the opportunity to interact with applications such as *Memrise* anywhere and at any time. These devices can also prove to be highly motivating as it takes vocabulary acquisition to a different level, many features of the application foster collaboration and interaction on a regular basis, thus improving linguistic skills. The *Memrise* website is a repository for hundreds of topics and it is relatively easy to create vocabulary lists for specific topics.

At this point, it is useful to identify some of the factors that could have a bearing on future studies. These are an analysis of the reading text, the development of the corpus and the selection of the key words in context. This can be achieved with the assistance of the free online analytical tools provided by www.usingenglish.com. This website hosts a variety of tools that is freely available for all to use. Samples of core materials (care should be taken that there is no copyright violation) can be easily uploaded and analyzed for everything from readability levels to key words in context, thus making the creation of your specific *Memrise* course straightforward for non-language specialists. For future research, it would be beneficial to triangulate the results with additional reliable vocabulary comprehension instruments that support the

self-reporting. This could lead to a validation of self-reporting vocabulary tools in this context.

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