The effectiveness of a CALL multimedia classroom on L2 learners' achievements, attitudes and the word solving strategies' frequencies and the perceptions of helpfulness, when compared with learners in traditional classrooms: A quasi-experimental study

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The effectiveness of a CALL multimedia classroom on L2 learners' achievements, attitudes and the word solving strategies' frequencies and the perceptions of helpfulness, when compared with learners in traditional classrooms: A quasi-experimental study

by

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School of Education

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بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ

اقْرَأْ بِاسْمِ رَبِّكَ الَّذِي خَلَقَ 2 . خَلَقَ الْإِنسَانَ مِنْ عَلَقٍ 3 .
اقْرَأْ وَرَبُّكَ الْأَكْرَمُ 4 . الَّذِي عَلَّمَ بِالْقَلَمِ 5 . عَلَّمَ
الْإِنسَانَ مَا لَمْ يَعْلَمْ

In the name of Allah, the most gracious, the most merciful

1.Read! In the Name of your Lord Who created. 2.He has created man from a clot. 3.Read! And your Lord is the Most Generous. 4. Who has taught by the pen. 5. He has taught man that which he knew not.

Kingdom of Saudi Arabia

Source: Google Map (2012)

Abstract

The current study was conducted with three primary objectives in mind. The first was to investigate students' achievements in immediate and delayed post tests in CALL multimedia and traditional classrooms as well as their attitudes towards using CALL for vocabulary learning. The second objective was to assess the frequencies of use of word solving strategies by learners in the two learning environments. The third objective was to explore the students' perceptions of the word solving strategies' helpfulness in these two different learning classrooms.

The participants of the current study consisted of 67 male Saudi students who were enrolled in the first year at the English department at Majmaah University, KSA. A quasi-experimental method was used as the researcher has chosen two classes from two Colleges without assigning the learners into groups randomly. The participants were 31 students from a Community College (treatment group) and 36 students from the Administrative Sciences and Humanities College (control group). Both Colleges were based in Majmaah City in Saudi Arabia. A Pretest/Posttest Control Group Design was adopted. Therefore, both groups were pre-tested to ensure that their language level with regards to the target L2 words were equivalent. In addition to this, their previous background and use of the word solving strategies were evaluated to ensure that all participants were aware of the word solving strategies use. Those reported to have used these strategies and showed that they were not introduced into any training or teaching on vocabulary learning strategies use in their previous educational stages.

The study utilised both quantitative and qualitative data collection methods. Pre-tests, as well as immediate and delayed post tests were used to investigate the students' vocabulary achievements. Questionnaires were used to examine the students' frequencies of word solving strategies use and its helpfulness perceptions. A questionnaire was also used to examine the treatment group's attitudes, (CALL group), towards learning vocabulary with CALL. With regard to the qualitative method, an oral interview was conducted with five students from CALL group in order to thoroughly investigate their attitudes towards their experience of studying vocabulary in a CALL multimedia classroom and how they utilised the most frequently used strategy.

The findings of the study showed that both groups had learned a significant number of the target words after the teaching sessions, but the CALL group outperformed the other group and the difference between the two groups' achievements in the immediate and delayed post tests were statistically significant whilst the effect size calculations showed that the CALL multimedia, (the intervention), had a positive impact on the treatment group. In addition, the learners' frequencies of the word solving strategies use, in both learning classrooms, were improved after the study, but the CALL group used these strategies more frequently than the traditional group, with the difference between them proving statistically significant. This was similar to the results for the helpfulness perceptions. The CALL group's overall perceptions regarding the helpfulness of the used strategies was greater than the traditional group's and the difference between them was statistically significant.

With this said, the findings showed that there was no discrepancy between the two groups with regard to the most and least frequently used strategies. The most commonly used strategy was the dictionary consultations whilst the least commonly used one was the skipping unknown word strategy. In addition, both groups perceived the dictionary use strategy as an extremely helpful strategy. The skipping new words strategy was perceived as the least helpful strategy by the two groups. The traditional group also perceived the ask classmate strategy as not helpful.

Positive attitudes towards CALL were also found by the CALL group. They confirmed that the existence of the computers in schools was very important. They reported that CALL was very effective for vocabulary learning. However, a few of the participants preferred using traditional methods to the CALL method as they were not very experienced in computer usage.

Acknowledgement

First, I would like to thank ALLAH, my God, Who guided me to the right path and helped me to reach this stage of my journey.

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Finally, a very warm thank you goes to my wife and sons, Abdulmalik and Abdullah, who provided me with support and created an atmosphere in which I could focus on my studies. They were very patient during the times I was away for study.

Dedication

I dedicate this work to my parents,

wife,

sons,

brothers and sisters,

soul of my grandma who died shortly before

submission,

and relatives

Table of contents

List of tables

List of figures

List of charts

List of graphs

List of abbreviations

LLS: Language learning strategies

VLS: Vocabulary learning strategies

WSS: Word solving strategies

CALL: Computer Assisted language learning

M: Mean

SD: Standard Deviation

SA: Saudi Arabia

N: Number

Sig: Significance

ES: Effect size

Q: Question

RQ: Research Question

Declaration

I declare that this thesis is as a result of my research and has not be been submitted for any other degree in any other university.

Chapter One

Chapter One

1.1 Introduction

In this chapter, the following themes will be discussed:

- Vocabulary Learning
- Vocabulary development
- An overview of education in Saudi Arabia
- The statement of the problem
- The significance of the study
- The purpose of the study
- The objectives of the study
- The organization of the thesis

1.2. Vocabulary Learning

Kiliçkaya and Krajka (2010) confirmed that learning L2 vocabulary is a challenging and difficult process and that L2 learners wish to know which method of vocabulary learning is beneficial to overcome this process. Similarly, Asgari and Mustapha (2011) stated that one of the biggest challenges that L2 learners suffer from during learning a second language is vocabulary learning. Chen (2006) regarded L2 vocabulary as one of the keys that lead to success in reading L2 texts.

Marttinen (2008: p.14) states that "vocabulary is a part of every language skill, and therefore improving vocabulary learning and teaching will contribute to reaching the goal of communicative competence". Siribodhi (1995) stated that vocabulary plays a significant role in the development of the four language skills of speaking, listening,

reading and writing. Vocabulary helps the speaker to diversify his or her use of language and provide clarity (Iheanacho, 1997).

According to Ghazal (2007), vocabulary is considered a central point of language, and it is also significant to language learners. Recently, researchers and theorists have recognized the prominent role of vocabulary knowledge. Consequently, many techniques, approaches and practices have been introduced into the field of vocabulary teaching (Hatch and Brown, 1995). Similarly, Hunt (2005) stated that vocabulary is believed to be at the heart of the language use and comprehension.

According to Evans (1978), using vocabulary wrongly can lead to misinterpretation or 'misunderstanding'. Correct use of vocabulary helps people to write and read better and to speak and understand key ideas correctly (Iheanacho, 1997). Lacking basic words and vocabulary is considered the primary problem for ESL students. Vocabulary is cited as the number one priority on the part of learners and teachers of second languages (Knight, 1994).

In the Saudi Arabian context, students suffer from a low level of English vocabulary, as confirmed by many studies that have evaluated the English learning in Saudi schools (e.g. Al-Akloby, 2001). So, the current study is very important as it attempts to research this problem in order to provide solutions for improving Saudi students' vocabulary learning. Therefore, it would be sensible to shed some light on the theories of vocabulary learning and vocabulary development in the following subsections.

1.2.1 Theories of vocabulary learning

According to Schmitt (2005), vocabulary is learned by either explicit 'deliberate' or implicit 'incidental' ways of learning. Ma and Kelly (2006) stated that vocabulary learning approaches are categorized into two main theoretical bases: explicit and implicit theories, so it would be useful to shed some light on these theories. The following subsections discuss the definitions of the theories of implicit and explicit vocabulary learning.

1.2.1.1 An explicit vocabulary learning theory

Schmitt (2008) stated that it has been suggested that explicit vocabulary learning is considered to be the most effective method, especially for learners who want to construct an initial meaning-form link. In the same vein, Nation and Meara (2010) suggested that explicit learning is very effective within the process of learning the first thousand words needed for basic communication. They also considered explicit learning to be more effective for building the core words in the initial stages of learning and for lasting the acquisition gains.

Ellis (1995) stated that the hypothesis holds that the acquisition of new words for the learner is strongly facilitated by the exploitation of a variety of metacognitive strategies by (p.16):

1- Noticing that a word is unfamiliar;

2- Making attempts to infer the word from context (or acquiring the definition from consulting other people, dictionaries, or vocabularies);

3- Making attempts to consolidate this new understanding by repetition and associational learning strategies such as semantic or imagery mediation techniques.

Similarly, Dakun (2000) comments that Gass (1999) and Schmidt (1990) indicate that this vocabulary learning paradigm holds that "a certain amount of consciousness must be involved in vocabulary acquisition, from the learner noticing novel vocabulary, selectively attending to it, and using a variety of strategies in trying to infer its meaning from context" (p.16).

In addition, he stated that applying cognitive strategies is beneficial to consolidating new words by consulting dictionaries, taking notes and by associational strategies. In this position, CALL plays a potentially important role (Ellis, 1995).

1.2.1.2 An implicit vocabulary learning theory

Nation (2003) stated that implicit vocabulary learning occurs when the learner's focus is on the message or meaning rather than concentrating directly on the form used. Sonbul and Schmitt (2009) mentioned that incidental learning is described as a by-product of any language learning activity.

This theoretical perspective holds that vocabulary can be acquired unconsciously through repeated exposure in various language contexts (Dakun, 2000). This theory is exemplified by Krashen's (1989) Input Theory. The Input theory assumes that language is acquired by understanding messages: “language is subconsciously acquired - while you are acquiring, you don’t know you are acquiring; your conscious focus is on the message, not form. Thus, the acquisition process is identical to what has been termed ‘incidental learning.’ Also, acquired knowledge is represented subconsciously in the brain - it is what Chomsky has termed ‘tacit knowledge’.”

(Krashen, 1989: p.440). In this case, Ellis (1995) stated that CALL's role will be just a means of exposing the learner to comprehensible input.

However, a few authors, such as Nagy and Herman (1987) and Anderson et al (1988), have supported Krashen. They also stated that language learning occurs at a low level of consciousness or implicit learning. Nagy and Herman (1987) assume that vocabulary grows from reading more effectively than from any explicit instructional program.

Anderson et al. (1988) also found that reading was a good vocabulary predictor as reported by their participants. Ma and Kelly (2006) also stated that the major source for implicit vocabulary learning is reading. The same belief is share by Nation (2003), as he stated that implicit learning mainly takes place through reading.

On the other hand, some scholars do not support the notion that the best method of L2 vocabulary learning is by reading (e.g. Horst, Cabb and Meare 1998, Raptis 1997). Alshwairekh (2001) said that reading is only one possible method for vocabulary learning and that there are others which need to be used in L2 learning.

By contrast, Shelton-Strong (2012), who has called for the integration of the two theories, urged people not to consider both implicit and explicit learning theories as opposites to one another, but instead said that they should be seen as complementary. This argument is consistent with Schmitt (2008) who stated that explicit learning is suitable for the extension of vocabulary, in terms of learning considerable quantities of new vocabulary.

1.2.2 Vocabulary Development

1.2.2.1 Knowing a word

In a second language, knowing a lexical item involves not only the pronunciation but also the spelling, derivation, function, association, collocation and position in grammatical constructions (Nation, 1990; Carter, 1998). Nation (1990) classifies word knowledge into two classes:

1- Productive knowledge;

2- Receptive knowledge.

In Kuen (2000), Nation (1990) states that "…the productive knowledge of a word includes the receptive knowledge plus knowing how to pronounce the word, how to write and spell it, and how to use it in correct grammatical patterns along with the words it usually collocates with " (p.11). In this study, the meaning and the pronunciation of new lexical words will be discussed as word knowledge.

1.2.2.2 Vocabulary Learning

Kuen (2000) states that knowing the ways by which an individual learns words is a common concern for teachers. According to Nation (1980), there are many direct and indirect approaches possible. To learn vocabulary directly needs a conscious effort to learn words in isolation or in context. Indirect learning is learning words incidentally through listening or reading.

Carter and McCarthy (1988) support learning vocabulary in context indirectly and learning word meanings through usage. In contrast, Nation (1990) sees that new words can be acquired in a short period through direct learning.

It is significant to make sure that the learned vocabulary lasts and that the learner retains them. The most important step is to transfer the newly acquired knowledge to the long-term memory. According to Nation (1982, cited in Kuen, 2000: p.14) long-term retention is '…the retention of at least twenty four hours and most preferably a week or more'. New vocabulary should be repeated after the first introduction or it will be forgotten quickly.

It is suggested by Nation (1990) that teachers should explain the meanings clearly and then move to the next piece of work. Learners should make efforts to complete the task using the new vocabulary to make the learning last. Also, he suggested that teachers could use definitions with pictures to help learners to remember the new vocabulary.

Ellis (1995) suggests, when using computers for language learning, using the spacing effect to boost vocabulary retention. Instead of massed presentation, teachers should give spaced presentations of new words. Repetition spacing is considered more significant than repetition frequency.

1.2.2.3 Vocabulary Presentation

According to Nation and Coady (1998), context is considered as syntactic discourse and morphological information in a given context. Vocabulary acquisition will be enhanced when learners process the lexical item's meaning by the linguistic context process (Yeung, 1989).

People acquire words from context (Nagy, 1997). So, in a second language, learners encounter more new vocabulary than speakers of a first language. In other words, the linguistic information should be manipulated in context by learners in order to master the new vocabulary. Therefore, there are more opportunities to gain support from the context to learn words.

To know the meaning of the new word, learners of a second language must be familiar with major words in the context and be familiar with clues to identify the meanings of unknown words. Linguistic knowledge, along with word background knowledge, are keys to guessing effectively (Kuen, 2000).

On the other hand, Duquette (1998) stated that it is not desirable to acquire vocabulary from context alone since it is not always easy for L2 learners to infer correctly, and as a result not all texts enhance vocabulary acquisition (Schatz & Baldwin, 1986). To solve this challenge, the lexical items have to be used in meaningful sentences and the context should include a high proportion of known words for the learners to facilitate learning the new words.

As seen in the discussion above, vocabulary plays an important role in learning the second language. In the following section, an overview on the Saudi educational system will be presented after discussing the statement of the problem that the current study will attempt to resolve.

1.3. Statement of the problem

In Saudi Arabia, English is taught as a foreign language in Saudi schools and universities. It is taught for seven years in public schools starting from the 6th grade of the primary stage until the third level of the secondary stage. From the 2011-2012 academic year, English is taught in the 4th grade in the primary schools and next year it will be taught in the fifth year.

Saudi Gazette[1], a newspaper, reported that "the Ministry of Education has started preparing an English language curriculum for fourth graders at all government schools from the start of the next academic year. Sources at the ministry said that the plan will be completed within two months. The curriculum includes the teaching of the English alphabet and numbers in addition to initial applications and practice books. The initial plan will see two classes per week. The language classes will only be for the fourth graders next year. Grade five will be taught the year afterwards. The Ministry said they will request the Council of Ministers to consider English classes for children below the fourth grade". Al-Zahrani and Al-Bahis (2011)

Despite this, the students' level of English is very low, particularly their vocabulary knowledge, when they leave secondary school (Al-Akloby, 2001). Al-Qahtani (2005) stated that vocabulary is a neglected aspect of language teaching in Saudi Arabia, and as a result learners leave schools with a low level of English.

According to Alfraidan (2010), English teachers teach students L2 words by explaining the meaning and how to pronounce these words in Arabic, and then in the

[1] http://www.saudigazette.com.sa/index.cfm?method=home.regcon&contentID=2011050599924

next class, they ask students about the meaning of these words to check their memorization of their meanings and spelling. Teachers do not teach their students how to use vocabulary learning strategies to overcome unknown words.

Many studies, conducted in Saudi Arabia, have confirmed that Saudi students' level of English is low. For instance, Al-Bogami (1995) concluded, in his study, that Saudi learners at both intermediate and secondary stages know only one third of the total taught vocabulary. This is an indication of the low level of vocabulary knowledge. Also, Alnujaidi (2003) found that the Saudi learners' active vocabulary is below 1000 words. According to Al-Akloby's (2001) study findings, the low level of English vocabulary for Saudi students can be attributed to various reasons as follows:

1- Inadequate use of vocabulary learning strategies.
2- Insufficient vocabulary presentation that is limited to pronunciation and L1 meanings of L2 words.

Also, Al-Shabbi (1985, cited in Alkhatib, 2011) found that this low level of English was due to the English courses failing to engage students, especially in the stages before university level. As a result, the researcher found that it is very important to look for methods that help learners acquire and learn English words effectively.

Therefore, this study focused on investigating learning L2 words in a different learning environment, namely CALL multimedia, which can provide students' with different methods of presenting vocabulary and help them to pay more attention to the vocabulary learning strategies.

1.4. An overview of Education in Saudi Arabia

In this section, a brief background of education in Saudi Arabia will be presented. This presentation will shed some light on the stages of public and higher education.

1.4.1 Public education

When the Kingdom of Saudi Arabia was founded in 1932, education was limited to individual instruction in mosques and was not accessible to everybody. In this period, Islamic law and basic Arabic literacy skills were taught. By 1951, there were 29,887 students in 226 schools.

In 1954, the Ministry of Education was established (Al-Qahtani, 2005). The policy for education in Saudi Arabia was derived from Islam. The policy decreed that education should be available to all and sponsored by the government (Alsenbul, 1996).

The latest statistics of the Ministry of Education for the 2010-2011 academic year shows that there was an increased number of both schools and students. The following table (1.1) shows the number of students and schools of the primary, intermediate and secondary stages:

Table 1.1: The latest statistics of students and schools numbers in KSA

Stage	**Gender**	**Schools**	**Students**	
			Saudi	All
Primary	Male	6784	1,107,697	1,273,119
	Female	6844	1,068,784	1,240,696
Intermediate	Male	4178	563,682	636,693

	Female	3820	489,664	561,721
Secondary	Male	2533	606,970	625,365
	Female	2480	444,776	500,237

These numbers indicate the special attention that the government of Saudi Arabia pays to education.

Children join the primary schools when they are six years old. Younger than this age means they are only eligible to join the kindergarten stage. In this stage, there are six grades. English, in this stage, is taught in two classes of one hour each, and these classes occur weekly in the fourth and sixth grades. With regard to the fourth grade, this was initiated in 2011-2012 academic year.

When a student passes all of the grades of this stage he or she will be moved into the next stage – the intermediate stage. In this stage, English is taught in four classes per week. In this stage, there are three grades that a student should pass successfully to be moved to the secondary stage. In the last stage, students study for three years. English in this stage is taught for four lessons a week.

The national policy for education aims to introduce the latest developments of educational technology. Therefore, in 2006 the Ministry of Education introduced computers as a separate subject in the third grade of the secondary school with one class per week and then increased this to two classes per week in 2007.

At the present time, the subject of computers is taught in all stages of public education. However, there are several steps the Ministry of Education has taken towards e-learning by undertaken a number of projects such as converting the libraries in schools to resource centres to accommodate both printed and non-printed information sources. These centers are equipped with the internet (Al-Qahtani 2007).

Over the past few decades there have been individual efforts of some teachers to integrate e-learning on a small scale (MOE, 2008). In 2008, the King Abdullah Public Education Development Project was founded, however, and it has several objectives. One of these objectives was to improve and prepare the educational environment through integrating ICT into education (MOE, 2008).

1.4.2 Higher education

The Ministry of Higher Education was established in 1975 (MOHE, 2012). It currently supervises 25 governmental universities which award at least a BA degree, as shown in the table 1.2 below:

Table 1.2: List of public Universities in Saudi Arabia

No.	University	Establishment
1	King Saud	1957
2	Islamic	1961
3	King Abdulaziz	1964
4	Imam Muhammad bin Saud Islamic University	1974
5	King Fahad University of Petroleum and Minerals	1963
6	King Faisal	1975

7	Umm Al-Qura	1980
8	King Khalid	1998
9	Taif	2003
10	Qassim	2003
11	Taibah	2003
12	Hail	2005
13	Jazan	2005
14	Aljouf	2005
15	Al-Baha	2005
16	Tabuk	2006
17	Najran	2006
18	Northern Border	2007
19	Princess Norah	2008
20	Dammam	2009
21	Salman	2009
22	Shaqra	2009
23	Jazan	2005
24	Majmaah	2009
25	Electronic	2011

Also, the Ministry of Higher Education supervises 9 private universities and institutions, as shown in the table below (MOHE, 2012):

Table 1.3: List of private universities and colleges in Saudi Arabia

No.	Name of University/ College	Inception date
1	King Abdullah University for Science and Technology	2009
2	Prince Sultan	2000
3	Prince Muhammad bin Fahad	2007
4	Alfaisal	2008
5	Al Yammamh	2008
6	Effat	2000
7	Fahad bin Sultan	2005
8	Arab Open University	2002
9	Dar Al Uloom	2008-09

So, it is clear that the Saudi government sets a high priority in terms of higher education and allocates substantial sums annually to improve the outcomes of these universities (MOHE, 2012).

English, in higher education, is also one of the core teaching elements in all departments of all universities. Students study English for at least one semester when they join a university, but students, who join the English department, study all aspects of language learning including grammar, writing, listening, speaking, reading, history of English language, translation, interpretation and English literature.

1.4.3 Majmaah University

Majmaah University was established in 2009 and is the university where this study was conducted. It is one of the newest four universities in Saudi Arabia and was

founded in 2009. It consists of thirteen colleges distributed in **Majmaah, Zulfi, Ghat, Hawtat Sudair and Rammah** Cities, as shown in the table below.

Table 1.4: List of Colleges in Majmaah University

No.	College	Place
1	Education	Majmaah
2	Education	Zulfi
3	Science and Human studies	Hotat Sudair
4	Administrative Sciences and Humanities	Majmaah
5	Applied Medical Sciences	Majmaah
6	Science and Humanities	Ghat
7	Science and Humanities	Rumaah
8	Dentistry	Zulfi
9	Medicine	Majmaah
10	Computer Sciences and information technology	Majmaah
11	Community	Majmaah
12	Engineering	Majmaah
13	Science	Zulfi

There are also ten supporting deanships in this university as shown in the table below:

Table 1.5: List of Supporting Deanships in Majmaah University

No.	Deanship
1	Admission and Registration
2	Information Technology
3	Scientific Research

4	E-learning and distance learning
5	Quality and skills development
6	Community services
7	Library services
8	Graduate studies
9	Students affairs
10	Employees and staff affairs

As it is apparent, although Majmaah University is not very old, it aims to provide as effective an education as other modern universities. One of its planned efforts is to make use of technology in its colleges (MU.EDU.SA, 2012).

Al-Dawas (2012, cited in mu.edua.sa) states that "the establishment of the deanship of electronic education and distance learning in Al Majmaa University aims at promoting its vision and endeavors to being unique in improving the quality of education and learning throughout life, and in order to achieve its message of investment in knowledge through the improvement of education methods and the provision of modern techniques to its students in accordance with the highest levels of quality."

With regards to the teaching and learning of English, most of its colleges have a dedicated English department. Students, who major in this field, study for about 128 hours distributed into four academic years in order to be awarded a BA degree. They study Arabic, Islamic and social studies besides English subjects. The following table 1.6 shows the subjects that are taught to students in Ghat College, which is similar to other colleges in the university.

Table 1.6: Subjects taught in English Departments in Majmaah University

Introduction into Islamic culture	composition	Language skills	Vocabulary composition	Introduction into Arts
Vocabulary building	Islam and society building	English grammar	Reading comprehension	Economics in Islam
English literature	Poetry	Theatre	Arabic editing	Listening and Speaking
Basic language skills	Linguistics	Paragraph writing	Essay writing	Principles of political system in Islam
Translation English into Arabic	Introduction into American literature	Shakespeare	Linguistics studies	Phonetics
Speech				

The focus of the curriculum is quite traditional and it is clear that ICT or Computer Assisted Language Learning (CALL) is not included in the teaching plans of the English department, which means that students, in this department, are not trained about how to make use of computers in language learning.

In Majmaah University, there are few colleges which have a language laboratory. Therefore, teachers are not able to integrate CALL into the curriculum effectively.

Assadig (2012) confirmed that traditional methods of teaching are still used by teachers though they are willing and open to integrate technology.

The Administrative Sciences and Humanities College awards BA degrees to all graduate students from all departments, while the Community college does not award BA degrees. This college has two departments - Administrative and Humanities, which includes English and Accounting. The other department is Applied and Natural sciences, which includes Mathematics and computer sciences.

Students, who join this college, study for two years and then move on to other colleges related to their major to continue their BA degree. However, students in the computer sciences department are awarded an associate degree after two years of teaching (mu.edu.sa, 2012).

According to the University Guide (2012, distributed in Saudi Job Day in London), the statistics of the number of students registered at the English departments in the 2011-2012 academic year is shown in the following table:

Table 1.7: Number of registered students at Majmaah University

Colleges	**No. of Registered students in English Dept**	
	Male	Female
Education in Majmaah	280	419
Education in Zulfi	-	392
Science and Humanitarian studies in Ghat	210	172

Science and Humanitarian studies in Hutat Sudair	-	49
Community	167	-
Total registered students at all schools of Majmaah University	12633	

From the above overview of education in Saudi Arabia, it is clear that education is very important aspect and the government does its best to develop each aspect of education. Also, it is clear that the government has taken several steps to integrate technology in Education.

1.5. The Significance of the study

1.5.1 The importance of vocabulary learning strategies for L2 learner

It has been suggested that vocabulary teaching should not only aim at teaching specific words, it should also provide students with strategies that help them to expand their vocabulary (Goebel, 2001). Therefore, several studies have already investigated this issue (e.g. Schmitt, 1997; Oxford, 1990; Al-Qahtani, 2005; Alkhatib, 2011).

Also, several studies have indicated that vocabulary learning strategies are helpful for learning vocabulary, especially when they are used in a good learning environment. Ruutmets (2005) asserted that vocabulary learning strategies encourage students to take more responsibility for vocabulary learning.

Asgari and Mustapha (2011) mentioned that L2 learners need to be educated with vocabulary learning strategies to help them overcome the difficulties of learning L2 vocabulary process. Chamot (2005) stated that by using language learning strategies non-successful learners can be come successful ones. Nation (2001) stated that vocabulary learning strategies are very useful for learners of all levels of language.

1.5.2 The importance of Computer Assisted Language Learning in SA

Egbert (2010) stated that Computer Assisted Language Learning (CALL) is a method that adds an interesting environment for L2 learners. It also has a positive impact on the skills of foreign language learning.

Pennington (2004) indicates that CALL is considered the latest method that has an important influence on L2 teaching and learning. He mentioned that CALL potentially eliminates the barriers between the learners and teachers. Snowman and Biehler (2006) claimed that one of the factors that results in the learner's failure to learn a second language is the barriers between teachers and learners. They stated that the process of learning becomes easier with CALL. Calero (2001) stated that " the use of computer in the classroom was proposed as an ideal solution to make up for the limitation of the traditional classroom". (p.6)

In Saudi Arabian context, however, CALL is not usually used for learning and/or teaching English as a foreign language in Saudi public schools sufficiently, even though its effectiveness for vocabulary learning has been shown in the research literature. For instance, Aljarf (2007) stated that technology is not used in King Saud University for language teaching and learning effectively. Assadig (2012) confirmed

that the traditional methods of teaching and learning are still used in Majmaah University.

Arishi (2012: p.42) comments on the use of CALL in Saudi Arabia saying that "despite students' positive attitudes towards the use of CALL in some English programs in Saudi Arabia, there is still a gap between the time devoted to it and the time devoted to other skills. This means that some people still see CALL as a minor subject that should not be given priority over other skills."

This feeling leads us to recall what Bax (2003) emphasized, saying that although CALL has been in use for a long time, it still has not reached the "normalization level where it is regarded as a fundamental component of the classroom setting".

Yeh and Wang (2003: p.1) say that "CALL represents one potentially powerful method for increasing language learners' vocabulary size due to its capacity for multimedia presentation of glossary annotations". Therefore, in this study CALL multimedia will be used for learning vocabulary.

1.5.3 The need for research on vocabulary learning strategies in CALL environments

Several researchers stated that there are yet few studies which have investigated vocabulary learning strategies in a learning environment supported with Computer Assisted Language Learning (e.g. Abdul Razak, 2000; Hyte, 2002, Seglar et al., 2001; Loucky, 2006). Most of the key studies that investigated the frequencies of vocabulary learning strategies use and its perceived helpfulness were conducted in

traditional learning environments (e.g. Schmitt, 1997; Gu and Johnson, 1996; Oxford, 1990; Alqahtani, 2001, Alkhatib, 2011; Lip, 2009).

Also, studies, that researched the learners' use of word solving strategies during reading an L2 text, have been conducted in conventional classrooms, particularly those done in Saudi Arabia (e.g. Alsweed, 1996, 2000, 2005; Alqahtani, 2001). In addition, these studies did not assess the learners' perceptions towards the helpfulness of the use of word solving strategies.

Atay and Ozbulgan (2007) claimed that training learners on vocabulary learning strategies in a CALL environment aids learners to become more effective learners.

Amora and Bernardo (2009) stated that investigators, whose focus is on L2 language learning, are more interested in exploring what strategies L2 learners tend to use for comprehending texts and remembering information. Therefore, the findings of the current study would have significant implications for vocabulary learning.

1.6. The purpose of the study

The purpose of the current study is to practically investigate to what extent using CALL multimedia in learning L2 vocabulary as compared with teaching them with traditional methods would affect the learners' achievements in the department of English in Majmaah University when learning L2 words.

This study also explores to what extent CALL would encourage learners to use and make use of words solving strategies when meeting an unknown word, especially those words met during reading a written text.

In addition, this study will examine the learners' attitudes towards CALL multimedia. The outcomes of the study will provide solutions and suggestions for helping L2 learners overcome and learn new L2 words in the Saudi Arabian context.

1.7. The objectives of the study

This study was conducted to achieve the following objectives:

1- To investigate the effects of a CALL multimedia classroom on the achievements of students with regards to L2 vocabulary learning and to compare these achievements to those of students in the traditional classroom.

2- To investigate the effects of CALL on students' frequencies of reported word solving strategies use. This will be compared with students' in traditional classrooms.

3- To investigate the effect of CALL on students' perceptions of helpfulness regarding these strategies. This will be compared with students' in traditional classrooms.

4- To identify the attitudes of learners towards using CALL multimedia for vocabulary learning.

1.8. The organization of the thesis

This thesis consists of seven chapters. This first chapter is an introductory chapter, whereby the statement of the problem and the significance of the study are shown. Also in this chapter, the purpose of the study and its objectives have been outlined. Moreover, the theories of vocabulary acquisition have been introduced and an overview of the Saudi education system presented particularly in terms of the development of higher education and the context that this established for the study.

The second chapter discusses Computer Assisted Language Learning's history, development, models and definitions. Also, in this chapter the previous studies on CALL multimedia are presented.

The third chapter concentrates on language learning strategies, particularly vocabulary learning strategies. The definitions, classification, importance and taxonomies of language learning strategies are shown. Also, in this chapter the previous studies on vocabulary learning strategies, especially word-solving strategies, are demonstrated.

In the fourth chapter, the research design, research questions, hypotheses, sample and research methods of the study are clarified. The data collection methods and the procedure of implementing the study are also discussed. The fifth chapter presents both quantitative and qualitative data analyses.

The sixth chapter discusses the findings of the study and compares them with other relevant studies' findings. The seventh chapter is the last chapter, and this provides a

summary of the study and its findings. It also includes the recommendations and limitations of the current study.

1.9. Summary of this chapter

In this chapter, this aim has been to shed some light on the theories of vocabulary acquisition and the vocabulary development. Also, the context for the study has been introduced in terms of an overview of the education system in Saudi Arabia with special reference to Majmaah University, the university where this study was conducted, presenting the some potential causes for students' low level English.

Also, the importance and purpose of this study has been shown. In addition, the objectives of the current study have been stated and the organization of the current thesis has been introduced.

Chapter 2: Computer assisted language learning

Chapter 2: Computer assisted language learning

2.1 Introduction

In this chapter, Computer Assisted Language Learning (CALL) will be defined and discussed. This discussion will include the following topics:

- Definitions of CALL;
- Development and models of CALL;
- Advantages and disadvantages of CALL;
- Learning theories and technology;
- Multimedia;
- Attitudes towards CALL;
- Previous studies conducted in CALL environments.
- Effect sizes in CALL and vocabulary research

2.2 Definition of CALL

According to Sun (2003), CALL refers to the use of a computer for teaching or learning a language. Its root can be traced back to the more general approach to Computer Assisted Instruction (CAI). Over the past few decades, there has been a debate over CALL usage in the EFL classroom. Levy (1997: p.1) defines Computer Assisted Language Learning as "…the search for and study of applications of the computer in language teaching and learning". The majority of modern practitioners of CALL agree with this definition.

Davies (2000) defines CALL as an approach to language learning and teaching in which computers are used to aid the assessment, presentation and reinforcement of

material in order to be learned. Levy (1997) mentions that Computer Assisted Language Learning is used in a broad sense and that this term covers all the computer's roles in language learning including use of the internet, email and word-processors.

Salsbury (2006) generally defines Computer Assisted Instruction (CAI) as any strategy of instruction provided by computers. He adds that instructional forms, from individualised tutorials to investigative explorations, are classified as CAI. Instructions provided via the computer are said to be computer assisted, computer-aided, or computer-based.

According to Alresheedi (2008), the term, Computer Assisted Learning (CAL), is commonly used in the United Kingdom. In America, Computer Assisted Instruction (CAI) is used. Students and teachers concerned with language learning and teaching through the use of a computer often use the term CALL (Computer Assisted Language Learning).

2.3 An overview of the history of CALL

According to Lee (1997), the history of technology began in the late 1950s and early 1960s. Language laboratories and tape recorders permeated all foreign language teaching levels. There were some advantages to these materials such as providing opportunities for pupils to practice with spoken materials. Although these advantages existed, the results in general were unsuccessful. The reason for this lack of success was the fact that these materials were often integrated into the teaching system in an inappropriate way, which often replaced the teacher's role. In this period, many

learners and teachers became disillusioned with language laboratories and left them unused in many schools irrespective of their potential (Zettersten, 1986).

Fox et al. (1990) state that this failure was instructive because it revealed ignorance and insufficient research into technology use, as well as a lack of awareness about the importance of context in understanding language learning. However, the audio technology is now used in higher education to provide controlled pattern practice, testing and drills (Pusack & Otto, 1990).

In the 1970s, videos and computers arrived (Van Els et al., 1984), but these new technologies also encountered a number of problems. Video equipment was very expensive and was used inappropriately since it lacked flexibility and many organisations lacked the equipment maintenance systems. The use of computers was restricted to mainframe computers which were not suitable for the needs of learners and teachers. Such computers were generally inaccessible to students and teachers (Hainline, 1987).

In the 1980s, language teachers began to use microcomputers and videos. This was due to the rapid development of new technologies based on micro-electronics and computers in commerce and industry.

After the mid-1980s, the spread of cheaper and better quality microcomputers and video tape recorders began (Lee, 1997). Pusack & Otto (1990) summarise that new efforts to take advantage of this technology were encouraged by the existence of communicative and student-centred theories in FLT.

In contrast to the previous decades, video equipment was available and was now more familiar to language teachers, whilst a great deal of literature was also produced by many researchers (e.g. Allan, 1983; Kennedy, 1983; Tomalin, 1986; etc.) on video usage in classrooms. They discussed the potentials, limitations, and methodological considerations of audio visual aids to avoid the mistakes associated with language laboratories, reduce audio technology mistakes, and to emphasise that video use can be effective when it is integrated as a partner in all aspects of language learning or the teaching process (Phillips, 1985).

Lee (1997: p.17) states that in the 1980s "much more video materials were produced for FLT, helped as well by the advent of small-sized video cameras which allowed teachers to produce videos of their own for a variety of purposes in the classroom".

Another reason which encouraged video use was stated by Higgins & Jones (1984) namely that in the mid 1960s, the use of computers in education more generally gathered momentum. According to Pennington (1991), the computer applications in language learning were tied in with highly specialised work on language modeling based on logical and mathematical properties. Pennington (1991) states that there were developments resulting from computer use as follows:

"1) to compile, to access, and to analyse large databases of information about language;

2) to enhance language proficiency through word processing and through educational software that trains in reading, writing, speaking, and listening, either directly or as a by-product of work at the computer;

3) to test language via computerised assessment systems, and;

4) to conduct research on language learning with the aid of the computer" (p 4).

Pennington (1991) states that these are some of the practical research fields which were applied to the computer areas of language learning and teaching. However, computer use, in language learning and teaching, took concrete shape in North America at the University of Stanford (computer based foreign language teaching) and Illinois University (PLATO project).

In Britain, it took concrete shape at Essex University (The Project of Scientific Language) at the end of the 1960s (Ahmad et al., 1985). According to these authors, these projects contributed much to the material of computers and modern CALL developments.

According to Hope et al. (1984), educators took some time to assess the educational nature of computers and the methods for adapting and integrating them into curricula and learning programmes. In the mid 1960s, research into CALL began to investigate its cost and effectiveness in education. Lee (1997: p.18) states that from 1965 to 1975, Computer Assisted Language Learning was "…almost entirely geared towards tutorials and teaching the written language, i.e., drill and practice - grammar explanation and exercises - for beginners on terminals tied to a mainframe computer".

At the present time in the 21st Century, the development of computer programmes is much more rapid than in previous decades. Computers are now able to carry out multiple tasks at very high speeds and with high levels of accuracy by means of parallel processing. For example, CD-ROM and interactive video are able to play

sequences of video more accurately and at higher speeds than video tapes. It has been claimed that interactive video encourages students to participate actively through the live presentation of information (Atkins & Blissett, 1989).

Also, Scott et al. (1989) stated that interactive video is useful as it familiarises learners with foreign language's communicative functions by exposing them to the natural spoken language (Lee, 1997). Moreover, Moras (2001) states that anyone who is not using computers today feels outdated.

With this said, Computer Assisted Language Learning (CALL) is not a new development of the current decade as it has been used in language teaching since the 1960s. However, it is still lacking with regards to sound theoretical foundations and research methods **(**Moras, 2001).

2.4 The development of CALL

According to Meng and Hong (2004), over the last few decades, the development of Computer Assisted Language Learning can be categorised into three distinct phases:

1- Structural or behaviourist CALL;

2- Communicative CALL;

3- Integrative CALL.

Kessler (2005) summarises the developments of CALL as shown in the following table 2.1 :

Table 2.1: The developments of CALL

Time	CALL Approach	Concentration
1960s-70s	Behaviourist	Drill work, translation and grammatical explanations.
1970s-80s	Communicative	The use of language rather than the language itself.
1980s- present	Integrative	Recognising the integrated nature of technology as a tool rather than an isolated technique.

In the 1960s-70s, according to Moras (2001), the Behaviourist CALL was implemented when the method of audio-lingual practice was mostly used. This mode of CALL provided learners with practice and drills and featured repetitive language activities. Computers, in this model, were used as mechanical tutors to present drills and offer non-judgmental feedback, and allow learner to work individually, especially in the United States (Sun, 2005).

Communicative CALL emerged as a reaction to the more Behaviourist approach from the 1970s-80s. Supporters of this approach rejected the Behaviourist approach at both pedagogical and theoretical levels (Lee, 2000). The Communicative CALL approach concentrated on the use of forms rather than the forms themselves. Programmes written for this approach provided skill practice in a non-drill format through language games. Despite the fact that this approach gives learners control, interaction and choice, it still uses the computer primarily as a tutor.

Computers, in another CALL model used for communication activities, could also be a stimulus. An example of this is programmes which stimulate writing. In addition, computers were used as tools in the communicative approach. An example of this is programmes which do not provide language material, but instead aid learners to use the language such as through desk-top publishing, grammar checking programs and the use of word processors (Moras, 2001) .

Lee (2000: p. 2) in reference to the communicative approach states that:

"Grammar should be taught implicitly and students should be encouraged to generate original utterances instead of manipulating prefabricated forms … This form of computer-based instruction corresponded to cognitive theories which recognized that learning was a creative process of discovery, expression, and development".

An Integrative CALL approach depends on multimedia computers and the Internet. Hypermedia resources such as text, graphics, video, sound and animation can be accessed on cheap computers due to the developments of technology. These resources aid students in navigating through the internet and CD-ROMS by using a variety of media (Moras, 2001).

Lee (2000: p. 2) comments on this approach saying:

> "Teachers have moved away from a cognitive view of communicative language teaching to a socio-cognitive view that emphasizes real language use in a meaningful, authentic context. Integrative CALL seeks both to integrate

> the various skills of language learning (listening, speaking, writing and reading) and to integrate technology more fully into language teaching … to this end the multimedia-networked computer provides a range of informational, communicative, and publishing tools that are potentially available to every student".

Many researchers (e.g. Kessler, 2005; Healey, 2002; Opp-Beckman, 2002) state that this approach includes many aspects of constructivism as a theoretical basis.

2.5 Models of computer assisted language learning (CALL)

According to Sun (2005), there are five CALL models. The following table 2.2 illustrates them:

Table 2.2 : Models of CALL

Model	**Description**
Traditional CALL	Texts presented on screen and students respond by using a keyboard.
Explorative CALL	Makes use of colours to highlight grammatical features and feedback.
Multimedia CALL	A learner can record his/her own voice and play it back as part of a continuous dialogue with a native speaker.
Web-based CALL	Students communicate with teachers anywhere with immediate feedback.
Intelligent CALL	Analyses student's response and pinpoints errors.

Recent CALL approaches have favoured a learner-centred exploratory approach rather than a teacher-centered, drill-based approach. A characteristic of the exploratory approach is that of the use of concordance programs in language classrooms.

Johns & King (1991) describe this approach as Data-Driven Learning (DLL). Today, most CALL programmes are categorised as multimedia CALL. Multimedia programs take advantage of features such as Automatic Speech Recognition software to diagnose the errors of students (Sun, 2005).

The World Wide Web, which was launched in 1992, provides a great deal of potential in language teaching and learning. Immediate and frequent feedback from teachers to students made Web-based CALL very effective (Sun, 2005). Intelligent CALL programmes adapt themselves to learners' needs. They create a user profile by acquiring the learner's knowledge of a subject and their goals of learning before adjusting to the individual learner (Ellison, 2004).

2.6 The advantages of CALL in language learning and teaching

According to Razak (2000), textbooks have dominated the curricula of schools and have met most teachers' needs for many years. Now, textbooks are giving way to computers. Computers have become a popular tool in education. Recent CALL developments have made it possible to influence the quality of language learning and teaching. CALL is regarded by Hardisty & Windeatt (1989: p.5) as "…the term most commonly used by teachers and students to describe the use of computers as part of a language course".

Teachers of languages see the potential capacity of CALL as one of the most powerful teaching aids in the classroom (Razak, 2000). Kepner (1987) mentioned some CALL advantages for teachers and students. For teachers, CALL aids them in preparing and correcting a large number of exercises in basic skills and concepts, and in recording grades. It allows teachers to be updated and makes much more time available for real teaching.

For the learners, computers offer comfortable, faster and better learning opportunities. In addition, one of the important factors offered by computers is individual attention. Learners can keep track of their own progress by keeping records of responses. Students, who are working in a group, can take turns and participate in order to complete a task when they transfer their individual work to a cooperative work. Contrary to the past, computers enable users to perform a multitude of tasks. At times, teachers find it laborious to prepare teaching materials, keep student records, set examination questions and so on (Razak, 2000).

Alresheedi (2008) summarises some of the benefits of CALL by stating that computers aid in assessing learners' responses and providing appropriate responses, such as by showing certain messages. In addition, computers enable learners to move through the package's sections, depending on their answers. He adds that it has the capacity to present information in a video, text and audio form and can handle many language exercises. CALL materials are accessible to any person in this world through linking computers to the internet. Immediate feedback is also one of the benefits of computers (Kurshid, 1989).

Kuen (2000) mentions seven advantages of CALL in language learning and teaching. These are as follows:

1- *Greater variety of activities:* computers can provide text, sound and visual images which can offer various sorts of teaching materials with a wider range of activities. Additionally, technology can provide authentic materials for learning a language which include various kinds of activities such as speaking, writing, listening and reading. At any stage of preparation, refining and modification of materials are easy and possible.

2- *Individualism:* learners can learn at their own pace and computers cannot become tired or bored with repeating practice. The computer is patient and is able to provide learners with unlimited practice. It is also unbiased in terms of providing precise responses to the students. Warschauer (1998) asserts that computer's usage in language learning provides individual support. Chapelle & Jamieson (1986) share Warschauer's view and state that fast and slow learners are provided with individualized support by computers.

3- *Gathering data and keeping records:* the computer is able to keep records and gather data on computer-user interaction for subsequent analysis with regard to student progress, and for recognising students' patterns in learning (Chapelle & Jamieson, 1986; Kuen 2000: p.28).

4- *Immediate feedback:* the computer is able to assume the teacher's role in evaluating students and giving instant feedback (Levy, 1997; Ahmad et al., 1985) and following up with remedial action (Chapelle & Jamieson, 1986). These are very important in strengthening the learning effects for students. For weak students, Rühlmann (1995) says that repetitive practice and self-checking can be done objectively and this is very significant for the weak

learner who may feel embarrassed when exposing his or her mistakes in front of the class.

5- *Motivation and fun:* many researchers (e.g. Rühlmann, 1995; Warschauer, 1998) state that computers can provide fun and motivation for learners as CALL software is creative and tailor-made for students. Several cross-disciplinary investigations have been conducted and have found a positive relationship between computer usage in learning and traditional teaching. The learners are put in a multimedia environment of learning with the availability of powerful and advanced computers which produce sound, animation, graphics and videos. Learners may find this interesting when it comes to learning.

6- *Confidence building:* Rühlmann (1995) says "With CALL programmes, students learn actively, respond to questions, complete interactive tasks, enter a personal dialogue with their electronic tutor. Students can also assess themselves without the fear of losing face. In contrast to human behaviour, tutorial feedback in well-designed CALL programmes remains constantly supportive and patient".

7- *Cost effective*: the initial preparation cost of CALL programs is high, but these programs are able to replace a number of class hours and can be used by unlimited numbers of students at any time (Rühlmann, 1995). Overall this provides a mode of cost effective instruction for language learning.

2.7 The disadvantages of CALL in language learning and teaching

According to Razak (2000), computers, like any other educational tool, have certain disadvantages. Occasionally, they are suitable for some uses but not for others. Their

effectiveness is dependent on the users' creativity. Adams & Jones (1983) state that computers are no more than aids. It depends on our understanding of how students learn and our assessment of how this machine can help us accomplish our aims.

Ahmad et al. (1985) mentioned that the computer, as a tool, is incapable of action. In the same vein, Clement (1985) and Higgins and Johns (1988) mentioned that the computer is unable to solve problems without obtaining human instruction. This has prompted Higgins (1988) to describe the computer's role as pedagogue or 'slave', since it obeys orders and does not create questions. Kenning & Kenning (1983: p.61) state that "…not only do they (computers) operate mainly within the medium of the written language, but they operate in a predetermined fashion and cannot cope with the unexpected".

Alresheedi (2008: p.14-15) comments on the disadvantages of CALL and states that "Computers are unable to conduct open-ended dialogue in discussion sessions, as it does not have an adequate vocabulary and also does not understand human utterances delivered in mixed accents, languages, or through incorrect pronunciation. Still, there is a barrier in communication amongst learners and their teacher, despite students using packages prepared by computing and language experts."

Extensive preparation and careful training are required for CALL teachers, and educating teachers who become skilled in the process and delivery of CALL is a difficult and expensive process (Abukhzam, 2004). Educators in Saudi Arabia must be aware of the above negative issues that the CALL system has".

Kuen (2000) summarises five disadvantages of CALL:

1- *Problems in ready-made teaching packages:* there are many ready-made teaching packages in the market, but these must be modified by teachers according to the learners' needs. Unfortunately, many teachers are not sufficiently skilled and do not have the technological knowledge to develop or revise their own materials.

2- *Attitude of teachers:* some teachers, who have a computer phobia, cannot acquire the skills to handle a lesson of CALL. Getting to grips with a word processor and handling the mouse is hard work for them. In Saudi Arabia, a limited number of teachers are experienced in the use of computers.

3- *Restricted types of activities:* despite computers being powerful, it is difficult for them to handle all possible answers such as ambiguous ones. They are better deployed for use with certain kinds of activities such as matching exercises.

4- *Natural language:* Mak (1990) states that the computer is not able to reproduce or process natural language. It is able to calculate and match the output. Computers are also incapable of synthesising human speech, as well as interpreting and understanding all possible answers. Therefore, drill and practice programs are common for language learning since they are able to produce spontaneous feedback and students are able to work at their own pace.

5- *Difficulty in integrating with the existing curriculum:* it is not an easy job for teachers to integrate CALL into the formal curriculum due to the undesirable aspects of the computer learning programs and their lack of flexibility.

2.8 The Theories of Learning and Technology

A learning theory has been defined by Bigge (1990, cited in Hartsell, 2006: p. 54) as "the systematic and integrated viewpoint towards the process nature whereby people relate to their environments in such a way as to enhance their ability to use both themselves and their environments more effectively". Newby et al. (2000) defines a theory of learning as an organised set of principles which clarify how people learn and how they acquire new knowledge or abilities.

Heinich et al. (2002) view learning as a process in which the arrangement, selection and information delivery within an environment is affected by the way in which the students interact with that information.

According to Hartsell (2006), to implement technology to the instructional setting, an educator must recognise the applications, concepts and principles of different theories of learning. The weaknesses and strengths of each theory should be evaluated by the educator. This will help the educator assess how these theories can aid and augment the process of instruction or apply technology related activities.

According to Hartsell (2006), there are three existing theories in the instructional technology practice area. These theories are constructivism, cognitivism and behaviorism. This section will provide an overview of these theories.

2.8.1 Behaviorism perspective: learning from technology

Hartsell (2006) states that behaviorists agree that learning occurs as a result of external stimuli which are presented in the learner environment and change the

behaviour of the learner. Reiser & Dempsey (2002) believe that learning, for behaviorists, can be expected when a desired level of performance has been achieved. According to Forcier & Descy (2003), there are three kinds of educational designs from a behaviorist perspective:

1- Drill and skills;

2- Tutorials;

3- Educational games.

Drill-and-skills software emerged in the 1970s-80s. In that period, programmed instruction presented students with a problem and required them to respond and answer, whilst providing them with instant negative or positive reinforcement. Examples of drill and skill programs are Jurassic Spelling and Animated Multiplication and Division which can be found in online and CD-ROM format. Jurassic Spelling is a program of spelling practice found on CD-ROM. It provides a verbal reward every time a student spells a word properly. When the student has accumulated the required number of points, the student will be rewarded with a dinosaur picture as well as some information about it.

The Animated Multiplication and Division program is also found in CD-ROM format. It is similar to the previous program as it rewards students by allowing them to create a picture that this program will animate when a student corrects a certain number of math problems. Examples of online drill-and-practice programs are the A+ Math site (http://www.aplusmath.com/Flashcards/index.html) and bingo games (http://www.aplusmath.com/games/matho/AddMatho.html). In addition to these is a grammar program found on the Website of the English language Centre at the City

University of Hong Hong (http://www.cityu.edu.hk/elc/quiz/pronoun.htm) in which students should fill in the correct pronouns and then submit them to check the results (Hartsell, 2006).

Tutorials are unlike drill-and-skills. They are meant to teach new information to students. Tutorials can be used for remediation. Often these programs do not provide sophisticated contexts for experimentation and exploration. Tutorials allow more adaptation and branching features (e.g. choosing the first content to complete, skip a level) when the programmed instruction format is followed. In addition, they allow for some personalisation when students are asked for their names.

One of the CD-ROM based tutorials is Grammar Rock Schoolhouse (http://www.schoolhouserock.tv/Grammar.html) which follows this perspective in a more entertaining and adaptable way. Throughout the tutorial, a guide is provided who follows the students and provides instruction and feedback. Additionally, at the beginning of the program students type in their names which aids in saving their last location as a feature of tracking. Words, sentences, phrases and so on are provided for students who must type in the correct response. Following this, students will be rewarded with auditory and visual feedback. Grammar Gorillas is a good online tutorial example (http://www.funbrain.com/grammar/). A sentence is provided in this site and the student must select which word is a pronoun, noun and so on.

Once the answer is chosen by the student, the Gorillas will provide positive reinforcement such as Good Job when the answer is correct. If it is incorrect, it will give the right answer. A stimulus sentence is used on this website to prompt students'

responses and then give immediate reinforcement to aid prompt learning (Hartsell, 2006).

Educational games is the third kind of software which follows the perspective of behaviorism. It is similar to the drill-and-skill programs as these games provide an interesting theme such as a math problem solving to prevent the picnic basket from ants invasion. Occasionally, a variable time is provided in these programs to prompt students to solve the problem before something happens (e.g. a science lab blows up). In these programs, reward features are more sophisticated and students may achieve different proficiency levels such as lieutenant, to captain, to colonel. This reflects the performance of the students.

Super Solvers: Outnumbered is a CD-ROM example of educational games. This program is very creative for concepts of learning math where learners are given word problems and have to figure out how the problem can be solved. In order to solve different problems and to capture the villain, students should travel to different rooms. Along the way feedback is given and at the end of the game rewards come in the form of scored points.

Online examples of educational games can be found at websites such as Fun School (http://www.funschool.com) and Cool Math (http://www.coolmath.com) which provide parents, students and instructors with different games to learn. Features at these sites are very similar such as classifying games into various subject matters and grade levels. Resources in these websites are entertaining, colourful and provide various kinds of feedback.

2.8.2 Constructivism perspective: learning with technology

According to Hartsell (2006), constructivism is in contrast to cognitivism (see below section). Jonassen, et al. (2003) state that constructivists see that education cannot be separated from our ordinary experience. Learners assume that educational activities are controlled by making options related to their interests through developmental play and exploration. They added that the social intercourse supports using strategies of problem solving which in turn aids the learner in discovering how to think.

From this perspective, learners produce knowledge rather than processing received information from external sources. Therefore, the construction of knowledge is a process of interpreting and thinking about experiences. This is the main contrast with traditional theories where students depend on memorising concepts and facts. Norton & Wiburg (2003) state that constructivists set out with the concept that people construct the understanding of the world around and look for tools to aid them realise their experiences.

According to Newby et al. (2000), the practical application of this perspective falls into two areas:

1- Learning within an authentic context.
2- Collaborating with others.

Shafeeq (2011: p.680) stated that "collaboration is among the most useful ways in which learners acquire language at the computer". Collaboration, as defined by Beatty (2003), is a process in which two or more students need to work together to achieve a common goal, usually the completion of a task or the answering of a question.

Duffy & Cunningham (1996: p.61) state:

> "Constructivist modes of instruction place learners within a context to solve realistic and meaningful problems such as resolving the water shortage of an African village. To be effective though, the problem needs to be considered by the learners as relevant and interesting, realistically complex, and something that requires learners to use their knowledge. Because constructivists believe that learners gain more knowledge through the interaction of others, collaboration is important".

The instructor's role, from this perspective, has changed to that of a guide, a supportive partner in the process of learning as the instructor learns with students. Despite the fact that students are free with regards to how to attain instructors' goals, goals are still set. In addition, an assessment is still performed, 'but benchmarks are established and the instructor employs authentic measures such as evaluating a product or examining a portfolio as opposed to using formal assessments such as exams' (Hartsell, 2006).

Therefore, the instructor's responsibility is to create a collaborative environment where students can solve problems. This can be achieved when the instructor gives learners the opportunity to learn activities in a group with a model which encourages the actual process of knowledge construction, exploration and conversation (Newby et al., 2000)

Regarding its applications in instructional technology, the technology application's primary methods to represent this perspective are varied. These methods can be in the

form of using hypermedia or multimedia to create project based learning ventures, prompting group activities, and teaching content material. These methods take advantage of this perspective as in the process of learning, learners are active participants.

According to Jonassen et al. (2003), hypermedia and multimedia have allowed for constructivism advancement. Learners have more control over the process of learning with the aid of digital multimedia and hyperlinks such as video and sound clips. These aids provide avenues for learners to explore ideas, research information and present knowledge to others.

Software programs, such as *Toolbook* (http://www.sumtotalsystems.com /toolbook/index.html) and HyperStudio (http://www.hyperstudio.com) allow students to create their multimedia presentations based on their study topics. These projects apply the mode of constructivism learning as students must design and create such projects. First, they need to look for and locate the information before creating the text elements and multimedia required for that project. They finally decide on how to organise the data which would be involved in the multimedia project presentation and development. In cases whereby the instructor originally creates the programs of multimedia or hyperlinks, his/her role is only to be a guide to the students. However, hyperlink methods are suitable for advanced learners since beginners may get lost in the hyperlink's sea.

The Astronomy Village is a CD-ROM based software, developed by the National Aeronautics and Space Administration. An example of this perspective which

provides tools and resources in a virtual community to support scientific concepts exploration, learn about significant methods and concepts of astronomy, and to analyse researchers' gathered images and data. Learners, in this software, are required to choose an investigation, develop a plan, and then carry out the plan. Searching for the Supernova, earth crossing objects and Wobbler are investigations included in such software. At the end of investigations, learners show the findings to their colleagues (Hartsell, 2006).

According to Jonassen et al. (2003), constructivism, in technology based projects use, is encouraged by forming collaborative groups. Open-ended and student-directed research projects are examples of learners working as a team to investigate, decipher and show the findings using technology.

2.8.3 Cognitivism perspective: principles and applications

According to Hartsell (2006), the emergence of the method of cognitive teaching was a result of questioning the learning behaviorist theory for its limitations in approaching the understanding of learners' inherent information processing. According to Heinich et al. (2002) and Roblyer (2003), educational psychologists discovered that depending solely on observable behaviors was indecisive in clarifying or designing instructions for building higher levels of skill. When learning took place, behaviorists did not clarify how information was processed by learners and did not think about what went on internally. They depended solely on observable behaviors. As a result, this new perspective appeared. This new perspective is in contrast to the behavioral perspective as the latter concentrates on external stimuli while the former concentrates on the internal environment. Newby et al. (2000) stated that the central

principle is that learning is controlled by processes of internal memory rather than external stimuli. So, one must understand how the memory is working in order to understand behavior.

This theory of learning takes the perspective that information is processed by the learners actively and learning occurs through the learners efforts as they store, organize, and look for the information differences between old and new knowledge. So, the cognitive theory focuses on how an individual processes the information.

Newby et al. (2000) stated that there are two characteristics of memory. Memory is organized rather than random, such as grouping and creating lists in alphabetic order. The other characteristic is that it is active rather than passive, such as organizing new information with old. As a result, some cognitive strategies should be adopted to make sure that information processed by the learner is stored for later retrieval.

According to Newby et al. (2000), attention, encoding, and retrieval are processes involved in memory. Receiving information selectively from the environment is called *attention,* as the mind of a person cannot store information immediately. A process in which information is transferred into a meaningful form (e.g. linking pictures to information) is called encoding. Identifying and recalling information (e.g. remembering a particular fact or information for a specific purpose such as an exam) is called retrieval. So, learning takes place when the learner encodes new information in a new way. Therefore, in this perspective, conditions should be created by instructors to help learners receive, encode, and retrieve information. There are

several strategies of cognition that can be employed in order to aid students to store, process, and retrieve information.

According to West, Farmer, and Wolff (1991), there are eight cognitive strategies which can aid learners' information processing. Hartsell (2006: p.58) mentions these strategies as follows:

'(1) Chunking information into categories for easier retrieval by grouping sequences or similar topics

(2) Framing substantial amounts of information into a visual display as a graph or table

(3) Concept mapping information to generate relationships between different concepts

(4) Using an advanced organizer to bridge the old information with the new information to be learned

(5) Using metaphors, analogies, or similes so that partial meaning from one thing is transferred to something else

(6) Rehearsing information to help process material into the short term memory (e.g., notetaking, underlining, restating)

(7) Using imagery to learn concrete information;

(8) Using mnemonics as artificial aids for memorizing logically disconnected items'

The *Oregon Trail* simulation program is a good example of how this learning theory relates to technology application. Students, in this program, are required to decide on the best methods of crossing the plains of America in order to reach their final destination in Oregon. Another example is concept mapping software programs such

as *Inspiration/Kidspiration* (http://www.inspiration.com) which can be used in all areas of the curriculum and with any concept.

Also, problem solving software programs such as ZAP (http://www.superkids.com/aweb/pages/reviews/science/3/zap/merge.shtml) are another example of this perspective. These programs are unlike the behavioristic software programs, as the latter focuses on a simulation response approach while the former focuses on how students cogitate, investigate, and present their knowledge acquisition to others (Hartsell, 2006).

2.9 Multimedia learning

What is the definition of multimedia?

According to Doolittle (2001), multimedia has been defined by several researchers. For instance, Schwartz & Beichner (1999: p.8) define it as "the use of multiple forms of media in a presentation". Brooks (1997: p.17) defines it as "the combined use of several media, such as movies, slides, music, and lighting, especially for the purpose of education or entertainment". For Greenlaw & Hepp (1999: p.44), multimedia is defined as "information in the form of graphics, audio, video, or movies. A multimedia document contains a media element other than plain text".

Also, Maddux, Johnson and Willis (2001) defined multimedia as any computerized programs which include texts with at least one of the following: photographs, audio or sophisticated sound, music, 3-D graphics, video, animation, or high-resolution graphics. Mayer (2001) defined it as presenting a material by using both words and pictures.

2.10 CALL multimedia

With regard to CALL multimedia, it refers to any combination of text, video, sound, and animation delivered to students by computer for language learning purposes. CALL multimedia can be used for synchronous and asynchronous e-learning. The former means that "communication occurs at the same time between individuals and information is accessed instantly," such as with real-time chat and video conferencing for instance. With regard to the latter, it does not allow simultaneous or real-time communication between the learner and others, such as email. Abalhassan (2002: p. 43)

2.11 The cognitive theory of multimedia (Richard Mayer, 1997)

According to Hanley (2010), Mayer has extrapolated the cognitive theory of multimedia learning from three basic theories: Sweller's *cognitive load theory* (Chandler & Sweller, 1991; Sweller, 1999), Pavio's *dual-coding theory* (Clark & Paivio, 1991; Paivio, 1986), and Baddeley's *working memory model* (1986, 1992, 1999). In the following subsection, these theories will be discussed briefly.

2.11.1 Dual Coding theory (Paivio, 1986)

According to Paivio (2006), this theory involves the activity of two subsystems. This theory assumes that people have independent information processing systems for verbally and visually represented material. According to Hanley (2010), there are three stages for processing information.

Firstly, information enters our system of information processing via either the verbal processing system or the visual processing system. This stage is called input. Secondly, the information is separately and concurrently processed in the working memory, where relevant images and sounds are selected and organized. The last stage is the integration of the information from the two systems and connecting it to the previous information which is held in the long term memory.

2.11.2 The cognitive load theory (Sweller, 1994)

According to Sweller (1994), the capacity of working memory is limited to processing incoming sensory information. Hanley (2010) stated that participants can hold a few sounds and images in any presentation at one time. So, this theory suggests that for effective instruction care must be taken when designing any instruction so as not to overload the capacity of the mind for processing the information (Sorden, 2005).

2.11.3 Working memory model (Baddeley, 1992)

According to Baddeley (1992), the term of working memory refers to a system of the brain which provides the temporary manipulation and storage of data that are important for such complex tasks of cognition such as language learning and comprehension. Sorden (2005) stated that working memory is an expansion of the model of short term memory by Atkinson & Shiffrin (1986).

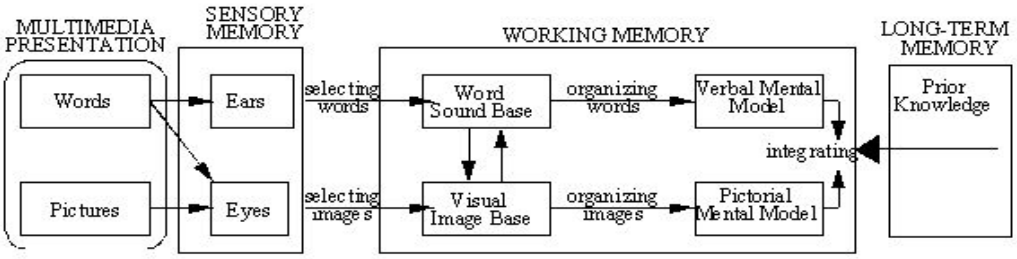
Baddeley (1992) says that working memory has been found to require the simultaneous storage and processing of information. Baddeley (1999) mentioned that the short term memory is an amalgam of several memory systems that are working

together temporarily. This amalgam was called working memory (Baddeley & Hitch, 1974). Baddeley (1992) said that working memory is divided into three subcomponents: the central executive, the visuospatial sketch pad and the phonological loop.

Mayer (2000: p. 47, cited in Moreno & Mayer, 2000) said that the principle of multimedia is that "people learn more deeply from words and pictures than from words alone". So, this justifies why the design of the PowerPoint slides in the current study included texts and pictures for demonstrating the target words.

Mayer (2001) based his cognitive theory multimedia on the following model:

Figure 2.1: Model of Mayer's cognitive theory of Multimedia



According to Doolittle (2001: p.2), this model is based upon three primary assumptions:

"1. Visual and auditory experiences/information are processed through separate and distinct information processing "channels."

2. Each information processing channel is limited in its ability to process experience/information.

3. Processing experience/information in channels is an active cognitive process designed to construct coherent mental representations."

According to Hanley (2010), Mayer's (1997) cognitive theory of multimedia learning assumes that learners are engaged in five cognitive processes so that active learning occurs:

1- Selecting relevant words for verbal processing in working memory
2- Selecting relevant pictures for visual processing in working memory
3- Organizing words into a coherent verbal mental model
4- Organizing pictures into a coherent visual mental model
5- Integrating verbal and visual models and connecting them to prior knowledge

Moreno & Mayer (2000) suggest that multimedia presentations in a verbal selecting process should not contain too much extraneous information in word or sound forms. They also suggest that verbal and pictorial information should be presented in synch with the organization process. By doing so, learners have opportunities to construct and integrated both verbal and visual cognitive representations (Sordon, 2005). Therefore, the researcher designed the explanations in the PowerPoint slides in keeping with their suggestion. Each slide shows one word with its relevant definitions and pictures.

According to Yoshii (2002), there is a shortcoming with regard to research design and materials of the studies that have investigated the effects of using text, picture, and text and picture glosses for learning L2 vocabulary. Studies, that proved the effectiveness of text-picture glosses for L2 learning in a multimedia environment, have used a within-subject design (e.g. Chun and Plass 1996, Plass, Chun, Mayer and Leutner, 1998). Therefore, in the current study, a between-subjects design will be used to avoid the shortcoming that has been stated.

2.12 Formative assessment

According to O'Neill (2010), formative assessment is a description for any feedback given to learners to show powerful positive benefits for their achievement and learning. Black and William (1998) consider the use of learning activities feedback in order to adapt the teaching to meet the needs of learners as 'formative assessment'. Nicol and Macfarlane-Dick (2006) showed that formative assessment and feedback as processes assist learners to control their learning.

Wren, (2008: p.1) stated that although most educators are familiar with the terms summative and formative assessments, some of them do not realize the differences between the two types. He says that "formative assessment takes place during an instructional unit, while summative assessment takes place at the end of the unit, the belief that timing is the key distinction between the two is erroneous".

Chappius & Chappius (2007-2008) stated that the vital difference between the two types is the purpose of the assessment and how to make use of the results. Formative assessment's results can be used to adjust the ongoing learning and instruction (Popham, 2006), while the summative instruction's results can be used for judgments such as final exams. So, formative assessment occurs during the learning and before the summative assessment.

Formative assessment is very important for the current study as one of the forms of this type is individual or group activities or anonymous surveys (Sewell, Frith & Colvin, 2010). Participants, in this study, will have an activity designed by Hot

Potatoes that includes a reading passage where the target words were gapped (see Appendix 9).

Hot Potatoes is a free download software for use by educators, in which they will be able to create interactive learning activities such as crossword puzzles, matching, fill-in-the-blank, jumbled sentences, multiple-choice answer, quizzes, or a combination of them all (Sewell, Frith & Colvin, 2010). While answering the activity, they will be able to get immediate feedback with an opportunity to re-answer it within the allocated time of this activity, which is 35 minutes (see Appendix 9).

2.13 CALL multimedia and student motivation

Research has shown that technology integration into classroom instruction can effectively and positively affect a learner's interest, engagement and motivation in learning, especially when learners use the designed software and multimedia programs for developing their knowledge and skills (Rieners, Renner and Schreiber, 2005). According to Page (2002), classroom technology significantly helps in increasing classroom interaction and student self-esteem. Learners in traditional classrooms become bored when the task is too easy and frustrated when the task is too difficult (Lumley, 1991).

Swan et al. (2005) stated that learners using mobile devices for learning, especially writing activities, found them easier than using pencils and papers. Moreover, Boster et al. (2002) reported that multimedia presentations help increase curiosity, attention, and interest, and this increase leads to increasing motivation, retention, better learning, and an improvement in student grades. Also, educational software can

positively impact student motivation by providing highly interactive technology which keeps learners engaged with realistic sounds, nonstop actions and vivid colors while providing educational instruction (Maushak et al., 2001).

Luac, et al. (2006: p.120) stated that "learner's motivation is the crucial factor for acquiring a foreign language and new technology greatly contributes to both English language teaching and learning". They also stated that CALL managed to make the boring drill process of language learning very motivating and interesting. Also, Folse and Chien (2003: p.1) state that "using technology in the classroom motivates students, encourages them to become problem solvers, and creates new avenues for the exploration of information and knowledge".

Mobile or fixed computer technologies can improve motivation and interest when students can easily gain access to them. Mobile learning, which can be promoted by using laptops and handheld computers, allows learning to extend beyond the traditional classroom by providing learners within the classroom with new opportunities for interaction which increases the engagement in student learning (Rieners et. al, 2005). Lewis (2004) asserts that when learners have access to laptops they feel more motivated to learn. In support to the approach of constructivism, educational software can engage learners to learn and think. Rieners et al (2005)

However, technology alone is not enough to improve the motivation of a student. Teachers should determine how to put the use of technology in the structure of learning and teaching. Lumley (1991) stated that teachers must be trained in how to

utilize technology. Lewis (2004) agrees with Lumley that teachers should be taught the methods of integrating technology resources into classrooms.

2.14 Attitudes towards CALL

In the previous literature, attitude has been defined in various ways. In the following table 2.4, we will present some of these definitions of attitude.

Table 2.4: Definitions of attitude

Writer	Definition
Thurstone (1964)	"the intensity of a positive or negative affect for or against a psychological object. A psychological object is any symbol, person, phrase, slogan, or idea toward which people can differ as regards positive or negative affect"(p. 39).
Konstantakis and Tsoukalas (2005)	"a positive or negative sentiment, or mental state, that is learned and organized through experience and that exercises a discrete influence on the affective and conative responses of an individual toward some other individual, object or event" (p. 331).
Bromely (1995)	the affect that it is both emotional and evaluative and shows the degree to which you dislike or like the attitudinal object.
Fishbein and Ajzen (1975).	"a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object" (p.6)

In language learning, according to Smith (1971), studies on attitudes started in the mid-sixties. Attitude is one of the most effective variables and has a significant role in L2 acquisition (Alshammari, 2007).

Merisuo-Storm (2006: p.228) says that “negative attitudes towards language learning can reduce learners’ motivation and harm language learning, whereas positive attitudes can do the opposite”.

In the current study, attitude means the learners' responses towards to a number of questions with regard to their views about the use of CALL multimedia for vocabulary learning.

2.15 Previous studies on the effect of using CALL on students' vocabulary achievements and attitude

In this section, the researcher reviewed some of key studies which investigated the effect of using CALL on students' achievements and attitude. Vrtacnik et al. (2000) mentioned that most of the studies reported higher achievements and better attitudes towards CALL being introduced in the classroom. Therefore, the studies, presented in this section, aimed at exploring L2 students' L2 vocabulary achievements and attitudes in a similar way to the current study.

Shafeeq (2011) investigated the effect of CALL on students' achievements and attitude. Twelve L2 learners participated in this study and were divided into two groups (CALL and No-CALL groups). Pre- and post-tests were used to measure the participants achievements. Also, attitude questionnaires and observations were used for data collection.

The findings of this study showed that the CALL group outperformed the No-CALL group in the vocabulary achievement test after the study. Also, positive attitudes were reported by the CALL group towards this experience.

Kayaoglu et al. (2011) explored the effect of using CALL multimedia on students' achievements and attitudes. The subjects of this study were 39 L2 students divided into two groups (control group 22, experimental group 17). Pre- and post-tests were used to identify their achievements. The pretest included 40 target words from a lesson about water cycle that the students will learn. The design of the post-test was similar to the pretest. Also, interviews and observation were used as tools for data collection. Interviews were done with the experimental group only.

The findings of this study showed that the experimental group's achievements were higher than the control group in the post vocabulary test. Despite this, the difference between the two groups was not statistically significant. However, the CALL groups showed more positive attitudes towards learning vocabulary with CALL and reported that they liked this experience.

Aljarf (2007) also investigated the effect of online instruction on students' vocabulary achievements and attitudes towards the use of CALL. The sample of her study was 53 Saudi students. The main instruments for data collection were pre and post tests and an open-ended questionnaire. The achievement test included 250 target words. The results of her study showed that the participants' achievement score in the post test was higher than their achievement in the pretest. The t-test showed that the difference in the means of the pre and post tests were statistically significant. Also, the results of

the questionnaire analysis showed that the participants had very positive attitudes towards online instruction for vocabulary learning. They regarded this method as a useful one.

Almekhalfi (2006) explored the effect of CALL on L2 Arab students' achievements and attitude. Eighty three students studying at elementary stage were the sample of his study. The participants were divided into two groups (43 as the experimental group, 40 as a control group). The researcher pretested the students' level of vocabulary in order to compare it with their achievements in the post test after the study. Also, he used a questionnaire to identify the experimental group's attitudes towards CALL.

The findings showed that the experimental group achieved a higher score than the control group and the difference between the scores was statistically significant. Also, the questionnaire analysis showed that the experimental group had very positive attitudes towards this experience and had intentions to use CALL in the future.

Hsu and Sheu (2008) explored the attitudes of 373 freshman learners at the National Kaohsiung University of Applied Sciences towards the use of CALL in their English classes. They created a website which contained six exercises taken from the Freshman English textbook. They used a questionnaire to collect the required data. The findings showed that 90% of the participants had positive attitudes towards CALL. They said that the website boosted their confidence and interest in learning English.

Alresheedi (2008) investigated the attitudes towards using CALL multimedia for L2 vocabulary leaning. Fifteen Saudi male students in the third grade of secondary school participated in this study. He designed PowerPoint slides that contained L2 words taken from the curriculum of the third year of secondary school, similar to those in the current study in terms of design. These slides were presented through the use of computers. The findings of his study showed that the participants had very positive attitudes towards this experience and were very interested in it.

Arishi (2012) conducted a study to examine the learners' attitudes towards using CALL for English learning. The participants of his study were seventy Saudi male students who were enrolled in the orientation year of English course. The data were collected by using interview and observation techniques.

The findings of his study showed that the participants have positive attitudes toward CALL. He stated that these positive attitudes can be attributed to several factors such as that learners' feel that CALL leads them to success in their course.

2.16 Previous research of using multimedia for vocabulary learning

Yoshii and Flaitz (2002) investigated 151 adult ESL learners who were divided into three groups: text only, picture only, and text and picture annotations. Learners were asked to read a story using the Internet. The researcher annotated the target words in the story. Immediate and delayed post tests were administered after the study. The findings showed that the picture plus text group performed best among the three in both the immediate and delayed post tests. This result indicated that the combination of text and picture was the most effective of the three types.

Yeh and Wang (2003) researched the effectiveness of three multimedia glosses; text only, text with picture, and text, picture and sound. The participants were 82 students studying at Taiwan University. In this study, they used L1 and L2 in the textual clues. The findings of their study showed that the text with picture type of materials were the most effective type compared with the other two types of glosses.

Also, Yoshii (2006) researched the effects of pictures on learning vocabulary incidentally. The participants were 195 Japanese university learners. They were assigned to four random groups in four types of annotations: L1 text only, L1 text plus picture, L2 text only, and L2 text plus picture.

The results of this study indicated that there are no differences between the text only type in the two groups, while text with pictures showed distinguished differences in the definition-supply tests. Also, this study indicated that there are interactions between language and pictures use.

Akbulut (2007) investigated the effects of using multimedia for learning vocabulary. The participants were 69 EFL learners studying at a Turkish university. He randomly divided the participants into three types of annotations; text only, picture only, and both text and pictures. He used pre, post, and delayed tests to collect data. His findings showed that the group that learned the new vocabulary with text and picture definitions achieved higher scores in immediate and delayed tests than the other types of definitions.

Kost et al. (1999) also compared the differences between using three types of glosses: L1 text only, picture only, text plus pictures - an integration of the two types. Participants were American learners learning German as L2. They found that the most effective type is the third one- text plus picture.

Luac, et al. (2006) investigated the effects of educational multimedia software on L2 vocabulary learning and attitudes towards using it. The participants of this study were 43 Croatian learners divided into two groups. The first group represented the traditional group. The second group represented the multimedia group. The researchers pre-tested the participants to ensure the equivalency of their knowledge level with regard to the target words. The results of the pre-tests showed that they were equivalent, so they were introduced into post-tests after the teaching sessions. The findings of the post-tests showed that learners, in the multimedia classroom, were better than learners of the other group with regard to their vocabulary knowledge. Also, the findings showed that learners' attitudes towards using multimedia for vocabulary learning were very positive. Most of them were very satisfied and were eager to continue studying with this approach.

2.17 Previous studies of using CALL multimedia for English learning and teaching in Saudi Arabia

In this section, previous studies that investigated the effects of using CALL multimedia for education will be presented, particularly in Saudi Arabia. Al-Jraiwi (1999) conducted a study about the influence of using multimedia on secondary

school learners' achievements. The experimental research method was used for this study.

The participants were 62 students divided into two groups. The experimental group consisted of 30 students who studied the material with multimedia tools. The controlling group consisted of 32 students who studied the material with the traditional methods. The findings showed that multimedia was very effective and had a positive impact.

Allhaib (1999) investigated the effectiveness and impact of using an instructional software package produced by the Sakr International company. This educational package was endorsed by the Ministry of Education in Saudi Arabia. The findings of this study indicated a high degree of effectiveness for this program and also showed a significantly positive effect on the students' learning. He suggested that the infrastructure of the schools should be improved.

Attwaim (2000) investigated the impact of using computer programs for grammar learning. The participants of this study were 60 students at the elementary level. They were divided into two groups of 30 students. The findings showed that the difference between the CALL and traditional groups' achievements was statistically significant.
Similarly, Al-juhani (1991) investigated the effectiveness of Computer Assisted Instruction (CAI) in teaching English as L2 in Saudi Schools in Yanbu City, KSA. The sample of his study was 60 male students divided into two groups. The first group represents the experimental group who were taught with CALL. The other group was the control group and they were taught with traditional methods. The instruments of

this study were a student survey and a teacher survey. The findings of the study showed that CALL was effective and would bring about a fruitful contribution to English teaching in Saudi schools.

2.18 Computer assisted language learning and language learning strategies

Abdul Razak (2000) said that there are very scarce studies on learners' strategies integrated with CALL. Also, Hyte (2002) asserts that there are few researchers investigated the effectiveness of using CALL to prompt meta-cognition and self-direct learning along with improving the experience of language learning. She stresses that further research is needed to figure out how can computers assist the process of learning particularly in language learning training.

She comments saying "as the need has developed to encourage self-directed learning in a metacognitively stimulating environment, CALL provides a controlled environment to supply language learners with proper exposure to strategies which facilitate metacognition and learner autonomy. Specifically, the use of hypermedia, where learners have the ability to access different nodes or levels of information in a non-linear fashion, displays encouraging effects in facilitating a self-directed learning experience" (p.22).

Zheng (1998), who conducted a study about CALL and metacognitive strategies, stated that the environment of CALL appears to be a more effective method to prompt self-directed learning and expose students to meta-cognitive strategies. Learners, by this way, are provided an opportunity to engage in a personalized, interactive experience of learning.

In the same vein, Dhaif (1990) stated that learners need to be consulted to discover their views about the effects of the computer usage on their task of learning. He conducted a study on CALL and learner's strategies at a university level.

Seglar, Pain and Soarce (2001) suggested that the taxonomy of Schmitt could be developed and implemented in an ICALL environment. They state that "… learners reading a text will have the opportunity to click on unknown words and choose between several explanation options, ranging from simple translations to L2 paraphrases, to hints such as morphological clues, related words in a semantic network, example sentences containing the word, mnemonic devices like the keyword method, and multimedia glosses such as pictorial representations … providing texts with glosses/online help functions … gives learners the opportunity to consolidate, reactivate and/or review vocabulary knowledge with tools such as note-keeping, net-building, etc." (p. 39)

Seglar et al. (2001) stated, in their conclusion, that little work had been done on vocabulary learning strategies particularly in an ICALL environment though their importance in language learning. They say "The importance of VLS in the group of language learning strategies is reflected by the fact that the vast majority of strategies in taxonomies such as Oxford's (1990) are either VLS ,(all strategies in the memory category), or can be used for vocabulary learning tasks.

Loucky (2006) says, with regard to the integration of CALL and VLS, that " there are as yet few studies examining what specific kinds of vocabulary learning strategies L2

students employ when using CALL materials and how the use of these strategies may differ in quality or quantity from those used when reading print materials." (p.373)

Based on previous discussions in the research literature, this thesis tries to contribute to this area of research by providing a foundation for further investigations of frequencies of word solving strategies and its helpfulness perception, as part of vocabulary learning strategies, in a CALL environment.

2.19 Estimates of the effect size in previous studies on vocabulary learning

According to Coe (2002), the effect size is rarely addressed in earlier research despite the fact that it is important and has been in existence for more than 60 years. Generally, the effect size has been used in meta analysis studies to a limited extent, but does not appear in most statistics books, nor is it featured in statistical programs. This is why the effect size is not used. The effect size is simply a way to quantify the difference between two groups. It emphasizes the difference in size rather than confounding this with the size of the sample. The effect size can be easily calculated and readily understood.

In education and social sciences, it can be applied to the measured outcome. Kirk (1996: p.97) says 'the effect size tells the degree of the association strength between two groups of mean scores.

According to Cohen (1977), the effect size value can be interpreted as follows: ES of 0.2 or less = small effect, ES of 0.5 – 0.4 = medium effect, ES of 0.4 to 0.8 or more =

large effect. Salkind (2008: p.97) stated "the larger the effect size, the less overlap there is between the two groups".

As in the current study, the effect sizes of the students' achievements in the immediate and delayed post tests will be assessed, it would be sensible to present the effect size estimates of previous literature with regard to vocabulary instruction.

The following table 2.6 presents some previous studies with the effect size values mentioned in Stahl and Fairbanks (1986).

Table 2.6: Effect size estimates in some previous studies taken from Stahl and Fairbanks (1986).

Study	Grade	Effect size	Comment	Test
Gnewuch (1973)	College	.025	Medium	n/m
Jenkins et al. (1978)	4	**2.47**	**Very large**	Immediate
		.47	Medium	Delayed
Jankins et al. (1978)	4	**3.41**	**Very large**	immediate
		1.11	**Large**	Delayed
Snouffer & Thistlethwaite (1979)	College	.000	No effect	n/m
Anderson & Kulhavy (1972)	college	**3.00**	**Very large**	First trial
		1.71	**Very large**	Second trial
Pany & Jenkins (1977)	n/m	**3.84**	**Very large**	Immediate
		3.41	**Very large**	Delayed
Ahlfors (1979)	6	**1.71**	**Very large**	Delayed
Mckeown, et al. (1983)	4	**6.15**	**Huge large**	n/m

Note: n/m: not mentioned

In addition, the researcher has calculated the effect size in some studies which investigated the effect of CALL on students vocabulary achievement based on the means and standard deviations as shown in the following table.

Table 2.7 : Effect size values in some studies done on vocabulary learning with CALL

Study	**Stage**	**Effect size**	**Comment**	**Test**
Aljarf (2007)	College	**5.19**	**Huge**	Immediate
Kayaoğlu (2011)	College	.59	Medium	Immediate
Ghabanchi & Anbarestani (2008)	Institute	.19-	Negative small	Immediate
		.05-	Negative small	Delayed
Iheanacho (1997)	College	**5.04**	**Huge**	Immediate
		4.02	**Huge**	Delayed

As shown in the table above, the effect size estimates of the intervention in some studies, which have been conducted in a CALL environment, were very large indeed on the treatment group.

2.20 Similarities and differences between previous studies and the current study

In this section, some of the similarities and differences between the current study and previous studies will be mentioned. Regarding the similarities:

1- The current study explored the effect of CALL on vocabulary achievement and attitude similar to some studies such as Almekhalfi (2006) and Aljarf (2007).

2- The participants of the current study are divided into two groups (experimental and control) which is also similar to the design of some studies explored the use of CALL for vocabulary learning.
3- The current study used pretest and post-tests to investigate the achievement of the participants which are similar to some studies, too.
4- The presentation of the vocabulary was in two different ways. The first method was only by text. The second method was by a combination of text, picture and sound and then a comparison was conducted between the two methods. The way of comparisons was also used with some previous studies.

With regard to differences, the following points clarify them:

1- Some of the previous studies were conducted in non-Arabic countries, while the current study was conducted in an Arabian country. So, the participants of the current study are not similar with theirs in terms of culture, first language and religion.
2- Most of the previous studies on CALL focused on investigating the effect of CALL on achievement, attitude and so on, but none has investigated the effect of CALL on the frequencies of word solving strategies and its helpfulness perceptions. The current study focused on this field, as part of vocabulary learning strategies, in CALL classroom.
3- Previous studies on vocabulary in CALL environments, particularly in Saudi Arabia, did not calculate the effect size values. But, this study will assess the effect size values.

4- Also, in some of the previous research that investigated the effect of CALL multimedia on learners' achievement used a within-subject design. But, this study used a between-subject design.

2.21 Summary of this chapter

In this chapter, Computer Assisted Language Learning has been discussed. This discussion was about some issues related to CALL such as definitions, history, developments, and models. Learning theories and technology were also discussed. In addition, previous studies that explored the effectiveness of CALL multimedia in language learning as well as learner's attitude towards CALL have been presented.

Also, this chapter demonstrated the importance of the effect size with estimates of the effect size values in some studies that focused on vocabulary in both traditional and CALL learning environments.

Chapter Three: Vocabulary Learning Strategies

3.1 Introduction

Vocabulary learning strategies (VLS) are just one component of language learning strategies (Nation, 2001). Therefore, this chapter will discuss issues related to language learning strategies, such as definitions and classifications, their importance and impact and then will discuss vocabulary learning strategies related issues such as taxonomies and categorisations, previous research, vocabulary learning strategies' research methods, vocabulary learning strategy instruction, factors affecting the choice of vocabulary learning strategy, and factors affecting the choice of vocabulary learning strategies.

3.2 The importance of language learning strategies

According to Ruutmets (2005), language learning strategies - including vocabulary learning strategies - enable language learners to control their own learning and encourage them to take more responsibility for their learning. Through the use of different vocabulary learning strategies, learners can decide how to deal with new words. Knowing vocabulary learning strategies and knowing how to apply them in appropriate situations make it easier for learners to learn new words. In the same vein, Nation (2001) stated that words can be acquired with the use of vocabulary learning strategies and they can prove useful for learners of all language levels.

Chamot (2005) stated that there are two reasons why learning strategies, in second language teaching and learning, are important:

> "First, by examining the strategies used by second language learners during the language learning process, we gain insights into the metacognitive,

cognitive, social, and affective processes involved in language learning. The second reason supporting research into language learning strategies is that less successful language learners can be taught new strategies, thus helping them become better language learners." (p.112)

3.3 Definitions of Learning Strategies:

There are many definitions of learning strategies. The differences between these definitions are perhaps because, in general, there is no agreed typology (Al-Shuwairekh, 2001). Therefore, it is important to discuss this issue further. Table 3.1 briefly states these definitions chronologically according to Al-Shuwairekh (2001).

Table 3.1: Definitions of learning strategies

Writer	**Definition**
Bialystok (1978: p.71)	defines a learning strategy as an optional means for taking advantage of existing information, in order to improve a second language competence.
Nisbet and Shucksmith (1986: p.24)	define it as the process that underlies performance on thinking tasks.
Weinstein and Mayer (1986: p.315)	learning strategies are the thoughts and behaviors which a learner uses, and they are intended to influence the encoding process of the learner.
Chamot (1987)	learning strategies are the techniques, deliberate actions or approaches which a learner uses to facilitate the recall and learning of both content and linguistic information.
Rubin (1987: p.23)	states that learning strategies contribute to the language

	system development that a learner builds, and directly affect learning.
Wenden (1987: p.6)	believes that learning strategies are the behaviors that learners engage in to learn, and that they also help them to control their second language learning.
Kirby (1988)	defined them as a tactics choice or combination which forms a plan in order to solve a problem.
Willing (1988: p.7)	states that they are specific procedures for rehearsing, processing and gathering information.
O'Malley and Chamot (1991: p.1)	refer to them as behaviors and thoughts which help individuals to learn or retain new information.
Oxford (1990: p.8)	learning strategies are the specific actions taken by the learner in order to ease or speed the learning process.
MacIntyre (1994: p.185)	defines them as the deliberate techniques that the learner uses to facilitate the process of language learning.
Davies (1995: p.50)	they are the mental or physical actions which the learner consciously or unconsciously uses for learning.
Brown (2000: p.122-127)	defines them as specific attacks that are made on a given problem. They are moment-by-moment techniques employed to solve problems passed by second language input and output.
Weinstein et al. (2000: p.727)	define them as any thoughts, behaviours, beliefs, or emotions that facilitate the acquisition, understanding, or

	later transfer of new knowledge and skills
Cohen (1998: p.5)	states that learning strategies constitute the actions that the learner consciously selects to use and/ or improve their second language learning.
Chamot (2005)	defines them as the procedures which facilitate the task of learning.

These various definitions present a number of problematic issues such as terminology, consciousness and processing (Al-Shuwairekh, 2001), which are discussed further below.

3.3.1 Terminological Issue

With regard to the terminological issue, the strategy concept is referred to as technique (MacIntyre, 1994; Sterm, 1975), learning process (Ellis 1985, Nunan 1991); move (Sarig, 1987); procedure (Faerch and Kasper, 1986); technique of problem solving (Barnett, 1988); skill of study (Rothkopf, 1988) and non-executive skill (Sternberg, 1983).

3.3.2. Consciousness and Unconsciousness Issues

One controversial issue regarding the definition of learning strategies is whether they are seen as either conscious or subconscious actions that a student intentionally employs. While some authors (e.g. Chamot 1987, MacIntyre 1994) consider them as

deliberate actions, others (e.g. Rubin, 1987) do not address them as conscious aspects of learning strategies. Rabinowitz and Chi (1987) suggest that to be strategic, learning strategies must be conscious; and therefore if they are performed automatically, they should not be considered as strategic. For Nisbet and Shucksmith (1986), learning strategies can be used at a level of unconsciousness.

3.3.3. Processing Issue

With regard to this issue, it is still ambiguous whether learning strategies should be perceived as cognitive or behavioral. In this respect, the definitions above can be classified into three groups:

1- Oxford (1990) and Wenden (1987) categorize them as behavioral processes.
2- Kirby (1988), Willing (1988), and Schmeck (1988) consider them as mental processes.
3- O'Malley and Chamot (1990) and Weinstein and Mayer (1986) consider learning strategies as both mental and behavioral processes.

Because of these issues regarding definitions and the lack of consensus in the literature, Brown, Bransford, Ferrara and Campione (1983) and O'Malley and Chamot (1990) suggest that operational definitions and specific terms to describe the processing of strategy should be used (Al-Shuwairekh, 2001).

3.4 Classification systems of language learning strategies

Several studies produced learning strategy inventories (e.g. Rubin 1975; O'Malley & Chamot 1990; Tarone 1981; Oxford 1990). As this study is going to use some of the

vocabulary learning strategies, this section presents a descriptive analysis of the strategies of second language learning and vocabulary learning strategy classifications.

3.4.1. Second language learning strategies classifications in general

Prakongchati (2007) states that defining and classifying language learning strategies is still being questioned and is apparently unanswered. According to Oxford (1990: p.17):

"there is no complete agreement on exactly what strategies are; how many strategies exist; how they should be defined, demarcated, and categorized; and whether it is - or ever will be - possible to create a real, scientifically validated hierarchy of strategies… Classification conflicts are inevitable."

Therefore, learning strategies have been classified by researchers in different ways by using different learning strategies concepts, definitions and criteria. Ellis (1994) asserts that language learning strategies have been classified differently according to the experience of researchers.

In 1978, Naiman and his colleagues classified learning strategies into two classifications, primary and secondary. This classification is based on their impact on language learning. Dansereau (1978) divides them into two categories, primary and support strategies. On the other hand, Tarone's (1981) classification has three primary strategies: learning, communication and production. She considers that the primary strategy is for language learning and that the other strategies are for language use. Wenden (1991) classifies them into two classifications, cognitive and self-management strategies, based on the learning function.

In the following subsection, the taxonomies of learning strategies by Carver (1984), Rubin (1987), O'Malley & Chamot (1990), Oxford (1990), Coleman (1991), Intaraprasert (2000) and Cohen (2003) will be discussed in some detail.

3.4.1.1 Carver's (1984) classification system of learning strategies

According to Prakongchati (2007), Carver divides learning strategies (Plans) into four categories as shown in the following table 3.2:

Table 3.2: Carver's (1984) classification of language learning strategies

1. Strategies for coping with target language rules	These are neutral with regard to production and reception e.g. reinterpretation, transfer from L1, simplification, generalization, hypercorrection, and elimination of register differences.
2. Strategies for receiving performance	These are for coping with the reception of language performance e.g. inferring from probability and knowledge of the world, checking by rereading / asking for repetition/ simplification/ self-interpreting confirmation, predicting from context clues, and identifying key terms from frequency/ knowledge of context/ chance.
3. Strategies for producing performance	These are for dealing with how to produce language learning performance e.g. monitoring reception of message, labeling discourse elements, repeating sentences/ key elements oneself and using routines.

4. Strategies for organizing learning	These are for organizing learning, and are related to the organization of learners in the task of learning including repletion, cognition, whole or part learning, concentration on spaced learning, together with cooperative learning through social interaction.

3.4.1.2 Rubin's (1987) Classification System of Learning Strategies

One of the earliest language learning strategy typologies was introduced by Rubin (1987). She classifies them into two main categories: direct and indirect strategies. These categories are then classified into three primary categories: learning, communicative and social strategies.

According to Rubin, learning strategies are those which contribute to language learning directly, while communication contributes less directly, and the social category has the least contribution (Al-Shuwairekh, 2001). Figure (3.1) shows Rubin's classifications of language learning strategies.

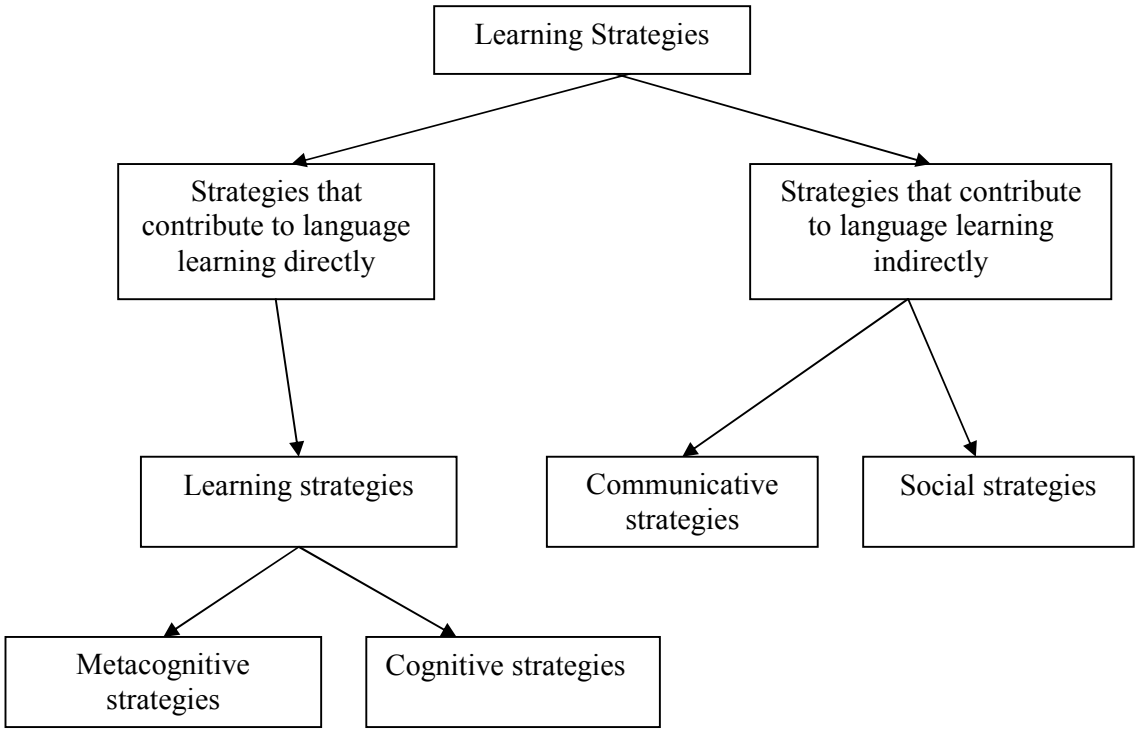


Figure 3.1: Rubin's language learning strategies classification

Learning strategies

These are strategies that contribute to the language system development that the learner constructs, and they affect learning directly (Rubin, 1987). There are two main categories: metacognitive and cognitive strategies.

Metacognitive Strategies

These are related to knowledge about regulation and application of this information, cognition and self directed learning through planning, evaluating and monitoring.

Communicative Strategies

These involve using one's communicative and linguistic knowledge in order to continue in a conversation. The use of repeating utterances, mime, cognates,

circumlocution and synonyms are examples of metacognitive strategies. Despite the fact that the use of communicative strategies is helpful for learning, "they do not exactly contribute to learning directly as their focus is mainly on better communication, and thus they only indirectly help learning to take place" Al-Shuwairekh (2001: p.74).

Social Strategies

These strategies provide chances for learners to expose themselves to and to practice the target language. Opportunities such as watching TV, reading books and listening to the radio can easily initiate communication. As these social strategies are used primarily to create an environment for practice and exposure, they do not contribute directly to learning.

Cognitive Strategies

Rubin defines these as those operations, or steps, used in problem solving or learning, which require transformation, synthesis, or analysis of learning materials. She suggests six strategies of cognitive learning:

- Clarification / Verification
- Guessing / Inductive Inferencing
- Deductive Reasoning
- Practice
- Memorization
- Monitoring. Hismanoglu (2000)

From the overall picture of Rubin's classification, 'it can be noticed that most of the strategies tend to include communication strategies rather than focus only on either formal language learning inside the classroom, or informal language learning outside the classroom.' Prakongchati (2007: p. 41).

3.4.1.3 O'MAlley & Chamot's (1990) classification of learning strategies

O'Malley and Chamot (1995) consider language learning through the process of consciousness in learning – a cognitive theory of learning. O'Malley & Chamot (1990) divided strategies of language learning into three main subcategories:

- Metacognitive Strategies;
- Cognitive Strategies;
- Social/ affective Strategies.

These are very similar to Rubin's classification i.e. learning, communication and social strategies.

Metacognitive Strategies

Hismanoglu (2000) states that metacognitive is a term to express:

- executive function,
- strategies that require planning for learning,
- thinking about the process of learning as it is taking place,
- monitoring of one's comprehension or production, and
- evaluating learning after completing an activity.

Among the main metacognitive strategies, it is possible to include functional planning, directed attention, selective attention, delayed production, advance organizers, self-monitoring, self-evaluation, and self-management.

Cognitive Strategies

These are mental operations for storing and retrieving information (Al-Shuwairekh 2001). They involve more direct manipulation of the learning material itself. Repetition, imagery, contextualization, key words, note taking, transfer, recombination, resourcing, auditory representation, grouping, translation, elaboration, deduction, and inferencing are among the most significant cognitive strategies (Hismanoglu, 2000).

Social/ affective Strategies

These are related to social-mediating activity and transacting with others. Question and co-operation for clarification are the main social/ affective strategies (Brown, 1987).

3.4.1.4 Oxford's (1990) classification of learning strategies

Oxford's classification is considered to be the most comprehensive and detailed classification (Alzughaibi, 2008). Oxford classifies language learning strategies into two main classes, direct and indirect, that are further subdivided into six groups. The direct strategies deal with various language tasks and situations, whereas indirect

strategies concentrate on managing and planning for the process of learning. Alzughaibi (2008)

Direct strategies

1. Memory (mnemonic) strategies – these help learners to remember information through making connections by grouping, imaging, moving physically, and structured reviewing.

2. Cognitive strategies – these aid learners in forming and revising internal mental models, and revising and producing messages in the target language, for example through means such as reasoning, practising, taking notes, and highlighting.

3. Compensatory strategies – these compensate for knowledge gaps, such as guessing meanings from context and using gestures to convey meaning.

Indirect strategies

1. Metacognitive strategies - these assist learners to manage themselves in the learning process and in specific learning tasks, such as arranging and planning one's learning, through selecting and identifying resources.
2. Affective strategies - these include identifying one's feelings (e.g. anger and anxiety) and becoming aware of the learning circumstances or tasks that evoke them.

3. Social strategies – these facilitate learning with others, and help learners to understand the culture of the target language, such as asking questions, working with peers, and learning about social and cultural norms and values (Oxford, 1990: p.18-21).

3.4.1.5 Coleman's (1991) Classification System of Learning Strategies

Coleman (1991) has another method of classifying learning strategies, specifically learning language within a large class environment. He has included a new category - contextual or environmental strategy - along with the other language learning strategies: cognitive, meta-cognitive and social / affective strategies.

This classification is derived from Coleman' small-scale investigation involving 40 Thai university instructors who produced 77 learning strategies. These strategies are believed to represent good examples of language learning strategies. The seventy seven learning strategies were classified under 18 strategy types, and then were grouped into three main categories as shown in the table below 3.3 (Prakongchati, 2007) :

Table 3.3: Coleman's (1991) classification of learning strategies

1-Related to the taught program	**2-Extra to the class**	**3-Bucking the system**
a- Before class *e.g. the lesson preparation before the class* b- In the class *e.g. paying attention*	e.g. using libraries and media.	e.g. sitting near bright students.

c- After the class *e.g. asking questions*		

Prakongchati (2007) states that "some aspects of metacognitive and social strategies are combined in the way that explores how successful and unsuccessful language learners prepare and manage themselves in the large-class learning context". (p.47)

3.4.1.6 Stern's (1992) classification of learning strategies

Stern (1992) classifies language learning strategies into five main categories. These are as follows:

- Management and Planning Strategies
- Cognitive Strategies
- Communicative - Experiential Strategies
- Interpersonal Strategies
- Affective Strategies

Management and Planning Strategies

These are associated with the learner's intention to direct his/ her own learning. A learner can take charge of his/ her own programme development when he or she is assisted by a teacher who plays the role of an adviser and resourcer (Hismanoglu, 2000). In this case the learner must:

- decide what commitment to make to language learning,
- set himself reasonable goals,

- decide on an appropriate methodology, select appropriate resources, and monitor progress, and
- evaluate his/ her achievement in the light of previously determined goals and expectations (Stern, 1992, cited in Kadubiec, 2009).

Cognitive Strategies

These are the steps, sets or operations used in learning or problem-solving, which require direct transformation, analysis, or learning materials synthesis (Kadubiec, 2009). The following are some cognitive strategies (Hismanoglu, 2000):

- Clarification / Verification
- Guessing / Inductive Inferencing
- Deductive Reasoning
- Practice
- Memorization
- Monitoring

Hismanoglu (2000)

Communicative - Experiential Strategies

Communication strategies are the techniques used by learners to keep a conversation going. Circumlocution, paraphrasing, gesturing, or asking for explanation and repetition are all subdivided strategies of communicative - experiential strategies (Kadubiec, 2009). These techniques are used to avoid interruption of the communication flow (Stern 1992, cited in Hismanoglu 2000).

Interpersonal Strategies

Students should monitor their own development and evaluate their own performance. Learners should make contact with native speakers and cooperate with them. Learners must become acquainted with the target culture (Stern, 1992: p.265-266).

Affective Strategies

It is evident that good language learners employ distinct affective strategies. Language learning can be frustrating in many cases. Sometimes, it is the foreign language itself that evokes the feeling of strangeness. In other cases, L2 learners may have negative feelings about native speakers of L2. Good language learners are conscious of these emotional problems and try to create positive associations towards the foreign language and its speakers, as well as towards the learning activities involved. Training to learn can help students to face up to any emotional difficulties, and to overcome them by drawing attention to the potential frustrations or pointing them out as they arise (Stern, 1992: p.266).

3.4.1.7 Intaraprasert's (2000) classification system of learning strategies

According to Prakongchati (2007), Intaraprasert classifies learners' learning strategies in a different way. In his study, he generated his own inventory of language learning strategies which is derived from the students' oral interview result.

This classification is based on what is being used to achieve the specific purposes of the language learning and resulted in two main categories of language learning:

1- Classroom related strategies.

2- Classroom independent strategies.

The following table 3.4 shows the details of Intaraprasert's classification based on Prakongchati (2007):

Table 3.4: Intaraprasert's classification of language learning strategies

I. Language learning strategies in the classroom-related category	**II. Strategies in the classroom-independent category**
A. To be well-prepared for the lessons 1- Study the lessons beforehand. 2 - Try some exercises in advance. 3 - Prepare oneself physically. 4- Do revision of the previous lessons.	**A. To expand their knowledge of English vocabulary and expressions** 1- Read printed materials in English such as billboards, leaflets, newspaper, and magazines. 2- Play games in English such as crosswords and computer games. 3- Watch an English-speaking film. 4 - Listen to English songs.
B. To keep up with the teacher while studying in the classroom 1- Listen to the teacher attentively. 2- Attend the class regularly. 3- Take notes while studying in class with the teacher. 4- Think to oneself along with the teacher while studying in class.	**B. To improve one's listening skill** 1- Watch an English-speaking film. 2- Listen to English songs or cassette tapes of English conversations. 3- Listen to a radio program in English. 4- Watch television programs in English.
C. To get the teacher's attention in the classroom	**C. To improve one's speaking skill** 1 -Talk to oneself.

1- Try to have an interaction with the teacher by asking or answering questions while studying in class. 2 -Take part in class room activities rather than just asking or answering questions. 3- Try to have an interaction with the teacher outside the class time.	2 -Try to imitate a native speaker from media such as films or cassette Tapes. 3- Converse in English with peers, siblings or foreigners. 4- Use a computer program like a 'chat' program. 5- Go to a private language school.
D. To learn new vocabulary in the classroom lessons 1- Memorize new words. 2- Use a dictionary to check the meaning of a new vocabulary item either in Thai or in English. 3- Guess the meaning of a new vocabulary item from the context. 4- Look at the root or the form of a new vocabulary item. 5- Group new vocabulary items. according to their similarity in meaning or spelling. 6- Use new vocabulary items to converse with peers.	**D. To improve one's writing skill** 1 Correspond in English by electronic mail (e-mail) or by a letter. 2 Practice writing sentences or essays in English. 3- Practice translating from Thai into English.
G. To avoid being distracted while studying 1- Try to get a seat in the front row. 2- Try not to talk with other students while	**G. To acquire general knowledge in English** 1- Seek opportunities to be exposed to English.

studying. 3- Sit next to a bright or quiet student. 4- Try not to pay attention to what other students are doing while studying.	2 -Go to a private language school. 3-Read printed materials such as books, textbooks or magazines in English. 4- Surf the Internet.
E. To solve the problems encountered in the classroom lessons 1- Ask the teacher in class either immediately or when appropriate. 2 - Ask the teacher after class. 3- Ask a classmate or classmates either in class or outside class. 4- Ask other people than one's regular teacher or classmates.	
7. To pass the English examinations 1- Revise lessons. 2- Practice tests from different sources. 3- Join a tutoring group. 4- Attend extra classes at a private school.	

In this classification, language learning strategies tend to be conscious choices. Intaraprasert suggests that these strategies would not be effective if the language learners use them inappropriately.

3.4.1.8 Cohen's (2003) classification system of language learning strategies

According to Abhakorn (2008), Cohen (2003) classifies language learning strategies into three main categories; by skill, by goal and by function. The following table 3.5 shows these categories along with examples:

Table 3.5: Cohen's (2003) Classification systems of language learning strategies

By Skill	By Goal	By Function	Example
listening	Language learning strategies;	Memory strategy	Using keywords
Reading	Conscious processes Learners choose to use language	Cognitive strategy	Taking notes summarizing
Writing	Language use strategies: conscious processes, learner chooses to use language	Metacognitive strategy	Organizing, self monitoring, self evaluation
		Social strategy	Asking for correction
		Compensation strategy	Coining words
Speaking		Affective strategy	relaxing

As shown in the above discussion that there were attempts to classify the language learning strategies by several researchers. In the following section, the light will be shed on categorizations and taxonomies of vocabulary learning strategies.

3.5 Categorisations of vocabulary learning strategies

Despite the fact that in the previous section we discussed vocabulary strategies indirectly within a review of the language learning strategies classification systems, Alseweed (1996) stated that vocabulary learning strategies, in L2 literature, are classified into three main categorizations as shown in the following table 3.6:

Table 3.6: Vocabulary learning strategies categorizations

1- Word solving/ attacking strategies	**2- Memorization or mnemonic strategies**	**3-Practicing strategies**
Guessing or inferencing Ignoring or skipping Appealing for assistance	Association or elaboration Recalling Repetition Note-taking	Cooperating with others in imaginary or real situations

In the current study, the first categorization will be further investigated. However, it would also be useful to demonstrate scholar's attempts (Cohen 1990; Brown & Payne 1991; Schmitt 1997; Gu and Johnson 1994; Nation 2001; Al Qahtani 2005) to classify vocabulary learning strategies in this section.

3.5.1 Cohen (1990)

According to Alshwairekh (2001), Cohen's taxonomy is considered to be one of the earliest classification systems related to vocabulary learning strategies. This classification consists of three groups as follows:

1- Strategies for remembering words.

These strategies include nine types of association techniques refined from Cohen and Aphek's (1981) classifications. Cohen and Aphek (1981) conducted two studies in 1977 and 1978. In these studies, the focus was on the vocabulary learning strategies that learners use and the role of mnemonics in word retention over time. Learners reported eleven kinds of association:

> '1- Associating Hebrew words with English words with a similar sound.
>
> 2- Associating part of a word with an English word by sound and meaning, and the other part with a Hebrew word by sound and meaning.
>
> 3- Associating sound and meaning with an English phrase.
>
> 4- Associating Hebrew words with other Hebrew words by sound.
>
> 5- Associating Hebrew words with proper names.
>
> 6- Associating Hebrew words with another language through meaning.
>
> 7- Associating by structure.
>
> 8- Associating by one or more letters.
>
> 9- Associating with a frequently-seen sign.
>
> 10- Associating with the place in the text where the word appeared.
>
> 11- Associating by making a mental picture of the word.'
>
> (Alshwairekh, 2001: p.80)

Cohen (1987) then refined these eleven association techniques into nine types as follows:

> '1- Linking the word to the sound of a word in the native language, to the sound of a word in the target language, or to the sound of a word in another language.

2- Attending to the meaning of a part, or several parts, of the word.

3- Noting the structure of part or all of the word.

4- Placing the word in the topic group to which it belongs.

5- Visualizing the word in isolation or in a written context.

6- Linking the word to the situation in which it appeared.

7- Creating a mental image of the word.

8- Associating some physical sensation with the word.

9- Associating the word with a keyword.'

(Alshwairekh, 2001: p. 80)

2-Strategies for practising words

There are three kinds of strategies for practising words: use of flashcards, grouping, and cumulative vocabulary study. The meaning of practising here is not clear as it is very difficult for grouping to be used for practice purposes. Erten (1998) stated that practicing may mean consolidating vocabulary learning.

3- Vocabulary Learning Strategies

The term Vocabulary Learning Strategies (VLS) is a broad one and includes three strategies: word analysis, learning of cognates and using a dictionary. These strategies are used for discovering new vocabulary meanings. Alshwairekh (2001) states two concerns after reviewing this taxonomy:

1- Each group has a very limited number of VLS.

2- As the last group is to discover new vocabulary, the others are to consolidate the learning of vocabulary or to commit vocabulary to memory, which means that the last two groups are similar.

3.5.2 Brown & Payne's (1994) Taxonomy

According to Hatch & Brown (1995), Brown and Payne (1994) classified vocabulary learning strategies into five groups which they refer to as five essential steps. They state that all five steps are important for learners to have a full knowledge of the vocabulary they are going to learn. The following are the steps involved in vocabulary learning in sequential order:

1- Encountering new words strategies.
2- Getting the word form strategies.
3- Getting the word meaning strategies.
4- Consolidating word form and meaning in memory strategies.
5- Using the word strategies.

3.5.3 Gu and Johnson's (1996) Taxonomy

In 1996, Gu and Johnson examined the vocabulary learning strategies used by Chinese learners at university. A questionnaire was given to students which included a section on their beliefs regarding 91 different vocabulary learning strategies.

According to Ghazal (2007), the students listed the following vocabulary learning strategies:

1- Metacognitive strategies,
2- Cognitive strategies,
3- Memory strategies, and
4- Activation strategies.

Al-Qahtani (2005) states that this investigation was comprehensive and substantial in the vocabulary learning research field. The following table 3.7 shows these strategies in detail, according to Alzughaibi (2008):

Table 3.7: Gu and Johnson's (1996) Taxonomy of vocabulary learning strategies

Metacognitive	**Cognitive**	**Memory**	**Activation**
-Selective Attention: identifying essential words for comprehension. **-Self-initiation:** using a variety of means to make the meaning of words clear.	**-Guessing:** Activating background knowledge, using linguistic items. **-Use of dictionaries** **-Note-taking**	**-Rehearsal:** word lists, repetition, etc. **-Encoding:** association (imagery, visual, and auditory)	**-Using new words in different contexts.**

3.5.4 Schmitt's (1997) taxonomy

Schmitt (1997) refines the vocabulary learning strategies taxonomy proposed by Schmitt and Schmitt (1993) and bases it on Oxford's (1990) taxonomy with some modification, as well as consolidation and discovery distinction. Alshwairekh (2001) states that this taxonomy is a significant contribution, as it provides a general framework for classifying the strategies of vocabulary learning and includes several vocabulary learning aspects. Schmitt divides strategies into two main types:

1- Discovery strategies

2- Consolidation strategies

These two classifications are further sub-classified as shown in the table 3.8 below, which has been excerpted from Schmitt (1997) as stated in Alzughaibi (2008)

Table 3.8: Schmitt's (1997) taxonomy of vocabulary learning strategies

Dimension	Discovery	Consolidation
Determination	Analyse parts of speech Analyse affixes and roots Check for L1 cognate Guess from the context Consult dictionaries Word lists	
Social	Ask teacher Ask classmates Group work activity	Study and practise in a group Teacher checks word lists Interact with native speakers
Memory		Image a word's meaning Connect to related words Group words together Study word sound/spelling Keyword method Use physical actions Use cognates Paraphrase word meaning Underline initial letter
Cognitive		Verbal/ written repetition Note-taking Put L2 labels on objects
Metacognitive		Use L2 media

		Test yourself Continue study over time Skip or pass a new word

Alshwairekh (2001) states that his two classifications correspond to Nation's (2001) distinction between increasing words and establishing words. Catalan (2003) states that Schmitt's taxonomy is distinguished from other taxonomies and has a number of advantages:

1- it is easy to standardize as a test and it is easy to collect answers from learners;
2- technologically, it is easy to encode, classify and manage data in computer programs;
3- it is based on two theories - learning strategies and memory;
4- it suits learners from different backgrounds, languages and ages.

3.5.5 Nation's (2001) taxonomy

This taxonomy is based on theory, unlike the other taxonomies that are derived from research findings (Alzughaibi, 2008). In this taxonomy, strategies are divided into three classes:

1- Planning: this includes making decisions on where, how, and how often concentration is given to words.
2- Sources: this includes gathering information about the word.
3- Process: this strategy involves finding knowledge about the word through retrieving, generating strategies and by noticing.

The following chart 3.1 shows Nation's (2001) taxonomy in some detail:

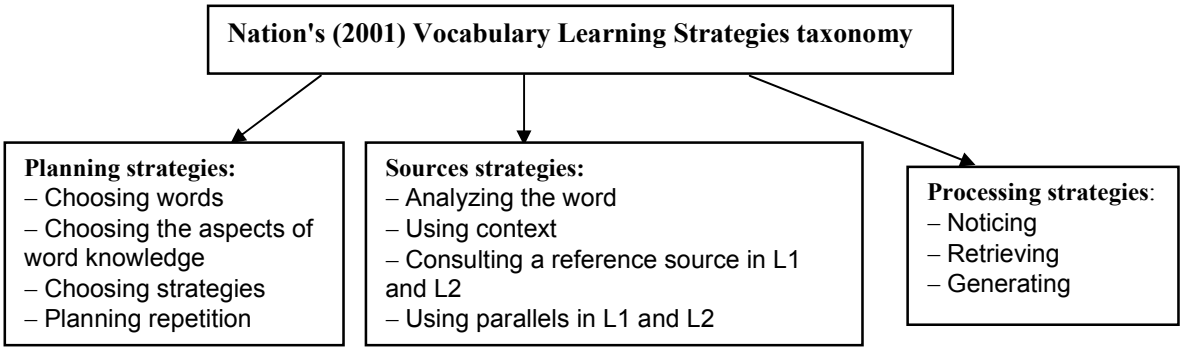


Chart 3.1: Nation's (2001) taxonomy of VLS

3.5.6 Al-Qahtani's (2005) Taxonomy

This is a more recent taxonomy of vocabulary learning strategies. It was introduced by Al-Qahtani who bases his taxonomy on Schmitt's distinction of discovery and consolidation strategies, along with accommodating other strategies taken from Oxford, Gu and Johnson (1996), and Stoffer (1995). According to Alzughaibi (2008), Al-Qahtani's taxonomy is classified into two groups:

1- Discovery strategies: these strategies are subdivided into:

   a- Solving unknown words

      - guessing
      - skipping
      - looking in a dictionary
      - asking someone

   b- Dictionary Use

      - Discovering aspects rather than receiving information.

2- Consolidation Strategies: these are classified into:

   a- Note-taking

   b- Memorization

Examples of these types of strategies include imagery, repetition, association and physical actions. In addition, social strategies are classified as discovery and consolidation strategies. Al-Qahtani provides two examples to demonstrate this notion:

1- Learning discovery and social strategies are used when a learner asks someone to explain the unknown word's meaning.
2- Learning alone strategies involve repeating vocabulary by him/ herself and using learning social strategies when asking someone to test him/ her.

3.6 Word solving strategies (WSS)

As one of the objectives of this study is to investigate the effect of CALL on the learners' frequencies of the use of word solving strategies and its perceived helpfulness, it would be sensible to shed some light on this category and previous studies on it.

3.6.1 Definitions of word solving / attacking strategies

Al-Qahtani (2005) states that there are various definitions for the term word solving or attacking strategies, for example word guessing strategies (Chern, 1993), discovery strategies (Schmitt, 1997) and lexical inferencing strategies (Walker, 1983). Nation (1990) mentioned that L2 learners use one of the following strategies when meeting a new word:

1- Guess it from context, picture etc.,
2- Ask someone,
3- Skip it, and

4- Look it up in dictionary.

3.6.1.1 Guessing strategy

Ffrench (1983: p.12) states that guessing is "the use of both pragmatic and linguistic clues to guess the meaning of an unknown word". Guessing, in a written text, will not be activated if one of the following three elements is missing. These elements are a text/context, unknown word and clues. With regard to the last element, there are two types of clues, which are presented in the following table 3.9:

Table 3.9: Types of contextual clues

Linguistic clues	**Non-linguistic clues**
Words	Pictures
Affixes	Background about the subject
Synonyms	Charts
Definitions	Tables
	Orthographic information such as *italic*

Alsweed (1996) states that guessing is difficult or impossible if one of these elements is absent. However, Scholfield (1987) mentions that inferencing or guessing the unknown word's meaning may be affected by several contextual clues. For instance, if the text has more difficult words, the possibility of guessing will be decreased because of less known words. This, unfortunately, is what happens with most academic texts. Learners, in such cases, either ignore the unknown word or decide to work out it and try another strategy. Similarly, Haynes (1993: p.53) states that "Guessing is apparently more difficult when comprehension of longer context is required".

Clarke and Nation (1980) suggest that guessing the meaning of the new word through using linguistic clues, such as affixes, should not be the first strategy as it might lead to incorrect inferencing. Alsweed (1996) asserts that without background knowledge about the subject, the learner will find it difficult to understand and vice versa. Carrell (1984) says that understanding a text, according to schema theory, is an interaction process between the text and the knowledge of the learner. Liu and Nation (1985) found that the learner will not be able to guess the meaning of the new word unless he/ she is familiar with at least 95% of the accompanying words. Ruutmets (2005) states that this strategy was found to be more useful for learning high-frequency words than for learning low-frequency words. Fan (2003) supports Ruutmets' view as low-frequency words generally appear in more complicated texts.

3.6.1.2 Dictionary use strategy

As guessing might be difficult to be used in some texts, L2 learners are advised to consult a dictionary. Haynes (1993) suggests that dictionary use is useful in such situations. Schmitt (1997) and Al-Qahtani (2005) argue that although learners often use guessing, they are more inclined to use a dictionary as guessing is not always possible because there may not be any contextual clues, or the student might be incapable of guessing.

Ruutmet (2005) mentioned that since there is little time to use a dictionary while speaking or listening, more dictionary consultations happen during reading or writing. However, a guessing strategy is considered to be the quickest strategy to obtain the meaning of the new word, while using a dictionary takes much longer.

However, L2 learners do frequently use a dictionary for almost every new word they encounter. Further, students meticulously refer to a bilingual dictionary for every word that they do not understand (Nation, 1990; Levine et al, 1984; Anderson, 1991). Clarke and Nation (1980) argue that learners should try to infer the meaning of the new word before looking it up.

3.6.1.3 Skipping or ignoring new word strategy

Alternatively, Yu-Ling (2005) states that there is another important strategy that L2 learners can use. It is skipping strategy. Skipping can be beneficial with low-frequency words which may not be met again. Also, skipping is useful if the whole text is to be understood. Alseweed (2000) mentions that with some unknown words, skipping can be useful.

On the another hand, Schofield (2003) does not regard skipping new word as a true vocabulary learning strategy, as how can anyone expect to learn an unknown word by skipping it?. Hosenfeld (1977) agrees with this because the learner who uses this strategy does not show any attempt to learn the new word.

Al-Qahtani (2005) stated that there are not many studies which investigated the role of using a skipping strategy as a vocabulary learning strategy. Most research focuses on guessing strategies.

3.6 Vocabulary learning strategies instruction

3.6.1 Can language learning strategies be taught?

Having discussed language learning strategies and vocabulary learning strategies above, such a question can now be posed. Abhakorn (2008) states that, based on the previous theories and the research that has been undertaken, the answer to the question is 'yes' as strategies are like the complex skills of learning a language that can be learned through practice and instruction. Chamot and O'Malley (1994) state that learners can develop their knowledge of strategies through scaffolding, whereby teachers help students to select the strategies that can help them to learn and use the second language. Oxford (1990) agrees with Chamot and O'Malley and states that by doing so, learning will be more fun and more effective. According to Abdel Latif (2006), the term strategy instruction should be used instead of other terms such as strategy training and/ or learner training. The following section discusses the importance of strategy instruction, along with any research on it.

3.6.2 Vocabulary learning strategies instruction: importance and research

According to Alzughaibi (2008), to accelerate and facilitate learning, foreign language learners should be trained how to learn efficiently and effectively. Weinstein and Mayer (1986: p.315) state that a teacher of a language is the person who trains his/her learners " how to learn, how to remember, how to think and how to motivate themselves". Zhao (2009) believes that if learners are explicitly trained to become proficient and more aware of the vocabulary learning strategies to use, they will be more autonomous and therefore their learning will be facilitated. Nation (2001) asserts that the most important advantage of language learning strategies is to enable learners to be more responsible and to control their learning. He adds, with regards to

vocabulary, that a sizeable amount of words can be learned through the use of vocabulary learning strategies.

Many researchers have investigated the effect of strategy instruction on EFL learners (e.g. O'Malley 1987, Alseweed's 2000, Tassana-ngam 2005). In particular, O'Mally (1987) investigated the effect of training EFL learners in using a metacognitive strategy (self-evaluation) and two cognitive strategies (grouping and imagery). The results showed that the students' vocabulary learning was improved. In the same vein, Alseweed's (2000) results indicate that the level of strategy use was greater in high proficiency students than in low proficiency ones after they had received training in word solving strategies. Tassana-ngam (2005) found that the ability of Thai EFL tertiary learners to learn vocabulary and their awareness of how to learn words was improved after they received training in using vocabulary learning strategies, namely semantic context, dictionary work, grouping, keyword method and mapping.

As a consequence, the participants, in this study, have been asked about their previous training of vocabulary learning strategies in their previous educational stages, to see whether or not they may need training in vocabulary learning strategies before implementing the study.

3.7 Vocabulary learning strategies research methods

According to Johnson (1977), research methods refer to the procedures that are followed by a researcher to achieve the study goals. In the field of language learning strategies, Intarapraset (2000) argues that the researcher must elicit information about the employed strategies of learning a target language by the learners as they learn that

language. Cohen and Scott (1996) state that there is no specific research method which succeeds in this field. In the same vein, Robson (1993) believes that there are several methods that can be used to investigate how learners employ the strategies of language learning to either enhance their learning, or to cope with language problems.

Siriwam (2007) reports that each research method has weak and strong points. He also states that methods of investigating language learning strategies can be adapted to investigate vocabulary learning strategies. Vocabulary learning is part of learning a language and the main research methods of vocabulary learning strategies are think-aloud, written questionnaire, classroom observation, diary studies and oral interview.

In the present study, two of these methods were used in the data collection; oral interview and written questionnaire. In the following subsection, the methods employed in this study will be discussed in detail.

3.7.1 Oral interview

Nunan (1989) describes this method as a direct conversation between a researcher and his/ her participants, either individually or in groups, to collect the information that is required. Punch (2005) said that it is one of the main techniques for gathering data in qualitative research, and is a very good method of accessing people's perceptions. Fontana and Frey (1994) mention that oral interviewing has various forms, for example face-to-face verbal interchange.

Brown (2001) stated that there are three types of interview; unstructured, semi-structured and fully structured interviews. Oxford and Burry-Stock (1995) state that

whatever the type of interview, it will provide personalized information about strategies of language learning that classroom observations will not be able to do. Nunan (1992) asserts that the semi-structured interview type is very popularly employed in qualitative research because of its flexibility. Also, this type gives the interviewees a degree of control and power over the course of the interview. This is consistent with Merriam (1998) who believes that this type of interview is flexible as it allows the investigator to respond to new situations or opinions on the topic instantly. Siriwam (2007) states that one of the good points of this technique is that it allows the researcher to provide some clarification in cases where the interviewees do not fully understand the question. On the other hand, he stated that one of the weak points of this technique is that it needs time and expenses for the researcher to physically meet and interview the participants.

3.7.2 Written Questionnaire

Many writers have defined written questionnaires (e.g. Richards et al. 1992, Brown 2001). A questionnaire, as defined by Richards et al. (1992), is a set of questions designed to ask respondents about a specific, or a group of topic(s). Similarly, Brown (2001: p.6) defines it as "any written instrument that presents respondents with a series of questions or statements to which they react either by writing their answers or selecting from among existing answers".

This technique has advantages and disadvantages. Cohen et al. (2007) state that written questionnaires have some advantages. Nunan (1992) mentions that questionnaires can be used in research to gather information from learners or teachers about their learning or teaching processes. Cohen and Scott (1996) commented on

questionnaires saying that they can be used to elicit responses of learners to questions about a topic, and that this process requires the researcher to give answers to the written questions. Therefore, the researcher should design a valid, reliable and unambiguous questionnaire. Siriwam (2007) says that questionnaires have weak and good points.

One of the good points is that questionnaires can be easily constructed and sent to many participants from different parts of the country. They can also be easily collected. One of the weak points is that respondents may not reply to all the questions - they send the questionnaire back with incomplete answers and often it is difficult to contact the interviewee again and ask him/ her to complete it.

As with oral interviews, written questionnaires have two formats. The first format is an open-ended questions questionnaire or an unstructured format which is qualitatively analyzed. The second format is closed-ended questions which are widely used as stated by McKernan (1996). Cohen et al. (2007: p. 321-322) comment on the advantages and disadvantages of the two formats as illustrated in the following table 3.10:

Table 3.10: Formats of written questionnaire

Format	**Advantages**	**Disadvantages**
Closed-ended	Highly structured questions can generate frequencies of responses amenable to statistical treatment and analysis	Do not enable respondents to give much information or explanations.

	Enable comparisons among respondents	Answers or choices may reflect what a researcher thinks not respondent
	Quickly analyzed	
Open-ended	Useful if answers are unknown	It can lead to irrelevant answers
	Enables respondents to give as much as information	Require much time to answer which may lead to not completed questions
		Not quickly analyzed

3.8 Factors affecting the choice of vocabulary learning strategies

Several researchers have found that there are several factors that affect the choice and use of vocabulary learning strategies (e.g. Ellis 1994, Rubin 1975, Oxford 1993, Oxford and Grooball 1990). According to Rubin (1975), age, proficiency level, culture and context are all factors that affect strategy use. Oxford and Grooball (1990) list further factors that are associated with the use of learning strategies such as gender, motivation, attitude and the language being learned.

Oxford (1994) lists eight factors which affect the choice of the vocabulary learning strategies:

> "1) Motivation: More motivated students tend to use more strategies than less motivated students, and the particular reason for studying the language (motivational orientation, especially as related to career field)

was important in the choice of strategies.

2) Gender: Females were reported to use a wider range of strategies than males in many studies (although sometimes males surpassed females in the use of a particular strategy).

3) Cultural background: Rote memorisation and other forms of memorisation were more prevalent among some Asian students than among students from other cultural backgrounds. Certain other cultures also appeared to encourage this strategy among learners.

4) Attitudes and beliefs: These were reported to have a profound effect on the strategies learners choose, with negative attitudes and beliefs often causing poor strategy use or lack of orchestration of strategies.

5) Type of task: The nature of the task helped determine the strategies naturally employed to carry out the task.

6) Age and L2 stage: Students of different ages and stages of L2 learning used different strategies, with certain strategies often being employed by older or more advanced students.

7) Learning style: Learning style (general approach to language learning) often determined the choice of L2 learning strategies.

8) Tolerance of ambiguity: Students who were more tolerant of ambiguity used significantly different learning strategies in some instances than did students who were less tolerant of ambiguity." (p.22-23)

Atherton (1995) and Nakamura (2000) state that the learning environment is one of the most important factors that affect the choice and use of vocabulary learning

strategies. Therefore, because of limited time, this study will only consider this one important factor i.e. the learning environment on the use of word solving strategies.

LoCastro (1993) and Kauraogo (1993) assert that a learner's ways and behaviors of learning in one learning environment are not necessarily similar to what he or she does in other learning environments. In the same vein, William and Burden (1997) state that the use of learning strategies is heavily affected by the whole context of learning. Gu (2003) widens the definition of the learning context to the learning environment which can include the teacher, the curriculum, the classroom as well as the social and cultural traditions of learning. Also, he mentions that cursory attention has been paid to the learning environment in previous research.

As a CALL multimedia environment is one of the modern environments for language learning, many researchers state that few studies have investigated the vocabulary learning strategies in CALL environments (e.g. Abdul Razak 2000, Hyte 2002, Seglar et al., 2001).

Accordingly, the present study will explore the impact of the CALL multimedia environment on the learner's frequency of use and helpfulness perceptions of word solving strategies compared with the traditional learning environment.

3.9 Previous studies on word solving strategies (WSS)

This section reviews some of the previous studies which explore the L2 learners' use of word solving strategies. Their findings will then be compared with the researcher’s findings in the traditional learning classroom. To the best of the researchers'

knowledge, there is no previous study which investigates this issue in a CALL environment, especially in Saudi Arabia.

The following table 3.11 shows some of the WSS research that will be presented in this section:

Table 3.11: Research on word solving strategies

Study	Participants	Instrument	Environment
Hosenfeld (1977)	40 L2 learners	Interview, think-aloud	Traditional
Alseweed (1997)	22 L2 learners	Questionnaire	Traditional
Alseweed (2000)	19 L2 learners	Interview, think-aloud	Traditional
Alqahtani (2001)	26 ESL learners	Questionnaire	Traditional
Alseweed (2005)	36 L2 learners	Questionnaire	Traditional

3.9.1 Hosenfeld (1977)

This study examined the word-solving strategies used by 40 students who were studying English as a second language. They were from Spain, France and Germany. Twenty of the participants had a high level of proficiency, while the other 20 students had a low level of proficiency, which is similar to our participants' level of English. Two instruments were used to gather the data - interview and think-aloud methods.

The findings of the study showed that the low proficiency level group considered using a dictionary as their first strategy to work out the unknown word. Skipping the unknown word was their least used strategy. The high proficiency level group used

guessing from the context as their most used strategy. This study suggests that the proficiency level affects the learner's choice of the vocabulary learning strategies.

3.9.2 Alseweed (1996)

Alseweed investigated the use of word solving strategies by 22 male postgraduate students in the UK, where Arabic was their mother tongue. They were studying in the UK for more than one year at Essex University. He classified them into two groups according to their studying period. Students who were studying for more than two years are classified as the advanced group (14 students). Students who were studying for less than two years were classified as the intermediate group (8 students). Questionnaires, consisting of 15 questions, were the method used to gather the data. Students were asked to select the answer that suited them best from the five-Lirket-type scale (Never-Always).

The findings of his study suggested that the participants use all word solving strategies, but the use of the dictionary was used by low level learners more than high level learners. High level learners preferred the guessing strategy and the second most frequently used strategy was using a dictionary. Low level learners used ask some one strategy more than the other group. The least frequently used strategy, for both groups, was skip the unknown word strategy.

3.9.3 Alseweed (2000)

This study was conducted to investigate the use of word solving strategies before and after WSS training and the differences between the low and high level of proficiency

students. The participants were 19 L2 Arabic speaking male students in the final year at university level divided into two groups – 8 with high level of proficiency and 11 with low level of proficiency.

He found that the participants used a range of word solving strategies before and after WSS instruction. Also, he found that the participants' use of word solving strategies increased after the training. In addition, he found that low proficiency level learners' first choice was dictionary consultation strategy, while guessing strategy was the first choice for the high level ones.

3.9.4 Al-Qahtani (2001)

This study was conducted on the vocabulary learning strategies used by 26 ESL students (20 Saudi, 6 Greek). Twenty of the participants were doing MA and PhD.

Al-Qahtani focuses on investigating:

1- word-solving strategies, including guessing, seeking appeal for help and ignoring unknown words
2- dictionary use strategies,
3- note-taking strategies,
4- repetition strategies, and
5- memorization strategies.

He used a closed questionnaire to gather the required information and also added one open question to allow his participants to add any additional information. A five-Likert-type scale was used (Never-Always).

He found that guessing from context was the most frequently used strategy for his high level of English students. He states that his participants guess the unknown words from local clues by looking at the words before, and after, the unknown word. Using a dictionary was the second most used strategy for them. Skipping strategy was the least frequently used one.

3.9.5 Alseweed (2005)

In this study, Alseweed investigated the use of word solving strategies by 39 Saudi male undergraduate students, studying their first year of English – this is similar to the researcher's participants. They had a low proficiency level of English. The main data collection method was a questionnaire. It was similar to the one he used in 1996.

The findings of the study showed that using a dictionary was the most used strategy (2.9). The second most used strategy was guessing from context. Asking about the meaning of unknown word was the third most used strategy. Finally, skipping was the least used strategy vis-à-vis other strategies.

The above studies will be compared with the researcher's findings involving the traditional group, as the above studies were conducted in traditional environments and examined the use of the words solving strategies in particular.

3.10 Previous studies on vocabulary learning strategies: frequency and helpfulness

The purpose of this section is to review some of the previous research conducted on vocabulary learning strategies, particularly the research which examined the frequency of use and helpfulness perception of the vocabulary learning strategies, which is the focus of the current study. Each piece of research will be reviewed in terms on the following:

1- Goal,

2- Participants,

3- Instruments, and

4- Environment

The following table 3.12 summarizes the studies that will be reviewed.

Table 3.12: previous studies of vocabulary learning strategies: frequencies and helpfulness

Studies	Goals	Participants	Instruments	Environment
Schmitt (1997)	Rank frequencies and helpfulness of VLS	600 Japanese L2 learners	Questionnaire	Traditional
Wei-Shi Wu's (2005)	Frequencies and perception of VLS	303 Taiwanese EFL learners	Survey	Traditional
Lip (2009)	VLS use and usefulness	36 Chinese EFL learners	Questionnaire	Traditional

3.10.1 Schmitt (1997)

This study was conducted with a relatively large number of participants. The participants were 600 Japanese junior high school, high school, university learners and adults. The participants were divided into four groups, and each group consisted of 150 participants from different towns and social class. Schmitt used questionnaires to examine their use of vocabulary learning strategies. The participants were asked to report whether they used these strategies or not, and rank their top five strategies, which included both discovery and consolidation categories.

The results showed that using a bilingual dictionary was the most used strategy (85%), followed by verbal and written repetition (76%). The next most frequently used strategies were studying the spelling and guessing from context strategies (74%), followed by asking classmates (73%). Saying the new word aloud strategy (69%), was followed by taking notes strategy (64%). The last two most frequently used strategies were studying the sound of a word (60%) and listing words (54%).

The least used strategies included physical action (13%), followed by checking for L1 cognates (11%), and using cognates in study (10%). Finally, semantic maps (9%) and teacher checks flash cards for accuracy (3%) were the least used strategies of all.

With regard to rating the helpfulness of these strategies, the findings showed that the most useful strategy was using a bilingual dictionary (95%), followed by saying new word aloud and written repetition strategies (91%). Connecting words scored 88%, followed by continuing over time and studying spelling strategies (87%). Asking the teacher for paraphrase and/or synonyms strategy rated 86%. The strategies of taking

notes, analyzing pictures / gestures, and verbal repetition were rated 84%. Further, his findings showed that the least helpful strategies were imaging the word's meaning (38%), followed by (34%) for using cognates in study and 31% for the key methods strategy. The last two least helpful strategies were (22%) for imaging the word's form and skipping or passing new word (16%).

Schmitt (1997) claims that learners from different cultures may have different views about the benefits of different strategies of vocabulary learning. According to Al-Qahtani (2005), Schmitt's study is considered as one of the most significant studies in the vocabulary learning strategies field, as he was able to present a comprehensive vocabulary learning strategy taxonomy along with learners' usage and helpfulness levels.

3.10.2 Wei-Shi Wu's (2005) study

This study examined the use of vocabulary learning strategies of 303 Taiwanese EFL learners, along with their perceptions towards their helpfulness. The participants were from high school and university levels. Wei-Shi Wu states that the language proficiency was not obtained because of the large number in the sample. He used a survey that was based on Schmitt's (1997) study and Chen's (1998) translated version. The survey was designed to identify which of the discovery and consolidation strategies are used most frequently, and which of them were rated as helpful, by the participants. Before implementing this study, he asked their two English teachers to give the students a brief presentation about the purpose of this study, and how to use this survey.

After data collection and analysis, the results showed that in the discovery strategy category, the electronic bilingual dictionary was used the most frequently, with the bilingual dictionary in second place. Guessing from context was the third most used strategy followed by listing words. Regarding the consolidation strategies, the most frequently used strategy was studying the sound of the word, followed by the written, verbal spelling repetition strategy - see tables 3.13 and 3.14 below taken from Wu (2005: p.11):

Table 3.13: Most used consolidation strategies findings of Wu's (2005) study

Top 5 most used strategies- Consolidate Meaning						**Average**	
JHS		SHS		US		1. Study the sound of a word	75.33%
1. Study the sound of a word	73%	1. Written repetition	76%	1. Study the sound of a word	81%		
2. Verbal repetition	71%	2. Study the sound of a word	72%	2. Verbal repetition	75%	2. Written repetition	72.66%
3. Written repetition	67%	3. Study the spelling of a word	70%	3. Written repetition	75%	3. Verbal repetition	72.00%
4. Study the spelling of a word	65%	4. Verbal repetition	70%	4. Say new word aloud when studying	64%	4. Study the spelling of a word	66.00%
5. Testing oneself with word tests	63%	5. Take notes in class	51%	5. Word Association	63%	5. Testing oneself with word tests	50.33%

Table 3.14: Most used discovery strategies findings of Wu's (2005) study

Top 5 most used strategies- Discover Meaning						Average	
JHS		SHS		US		1. Using electronic bilingual dictionary	79.66%
1. Using electronic bilingual dictionary	73%	1. Using electronic bilingual dictionary	77%	1. Using electronic bilingual dictionary	89%		
2. Ask classmates for meaning	70%	2. Bilingual dictionary	76%	2. Bilingual dictionary	85%	2. Bilingual dictionary	75.33%
3. Guess from textual context	67%	3. Guess from textual context	66%	3. Guess from textual context	78%	3. Ask classmates for meaning	70.66%
4. Bilingual dictionary	65%	4. Word lists	66%	4. Ask classmates for meaning	77%	4. Guess from textual context	70.66%
5.Ask teacher to provide Chinese translation	59%	5. Ask classmates for meaning	65%	5. Analyze affixes and roots	60%	5. Word list	56.00%

With regard to the most five most helpful strategies, the findings indicate that there are only four strategies which are rated as helpful in the discovery category; electronic bilingual dictionaries, bilingual dictionaries, guessing from context and asking classmates for a word's meaning, as shown below in the table taken from Wu (2005):

Table 3.15: Helpfulness ratings- Discovery strategies in Wu (2005) study

Helpfulness rating- Discover Meaning						Total	
JHS		SHS		US		1. Bilingual dictionary	481
1. Using electronic bilingual dictionary	123	1. Bilingual dictionary	175	1. Using electronic bilingual dictionary	220		
2. Bilingual dictionary	103	2. Using electronic bilingual dictionary	129	2. Bilingual dictionary	203	2. Using electronic bilingual dictionary	472
3. Guess from textual context	85	3. Word lists	99	3. Guess from textual context	160	3. Guess from textual context	341
4. Ask classmates for meaning	65	4. Guess from textual context	96	4. Analyze affixes and roots	121	4. Ask classmates for meaning	247
5. Teacher provides synonyms	62	5. Ask classmates for meaning	88	5. Analyze part of speech	99	5. Analyze affixes and roots	219

3.10.3 Lip (2009)

Lip investigated the frequency and usefulness of vocabulary learning strategies of 36 male and female Chinese EFL post secondary level students in Hong Kong. Their average age was 17. A questionnaire was the main instrument used to gather the data. It was adapted from Cheung's (2004) and based on Schmitt's (1997) vocabulary learning strategy taxonomy.

The questionnaire included 27 items of cognitive, determination, social and memory categories of vocabulary learning strategies. The frequency of use and their usefulness were scored according to the 5-point-Likert scale (1=Never to 5=Always; 1=Not Useful to 5=Extremely Useful). In addition, the researcher interviewed 10 students to examine more details on the reasons behind their choice of VLS.

The findings showed that the most frequently useful used strategies were 1) repeating the spelling of the word in the mind; 2) analyzing and repeating the word into sound segments; 3) remembering words by doing a project; and 4) asking classmates for meanings of words.

Also, the findings showed that there are strong and significant relationships between the most frequently used strategies and their perceived usefulness.

3.11 Similarities and differences between the current study and previous VLS research

The current study has some similarities and differences with other previous studies in the field of vocabulary learning strategies. The following points are the similarities:

1- This study made use of the previous studies in terms of designing the tools they used to collect data regarding the vocabulary learning strategies, such as a questionnaire and interview. Previous studies, such as Schmitt (1997), used questionnaire which was designed to gather the frequencies and perceptions towards learners' frequencies of vocabulary learning strategies and its helpfulness.
2- The current study focused on the word solving strategies, as part of the vocabulary learning strategies, which is the concentration of some studies such as Alsweed (1996, 2005 and 2000) and Al-Qahtani (2001).
3- The participants of the current study are Arab speaking students similar to Alsweed's sample. This allows making comparisons between our traditional group's response and their participants' in terms of the reported use of the word solving strategies.

With regard to the differences with previous research, here are some differences,

1- The previous research, investigated the vocabulary learning strategies frequencies and perceptions, conducted in only conventional environments. While the current study not only investigated the frequencies and perceptions in a conventional classroom, but also compared it with a CALL classroom.
2- The previous studies investigated word solving strategies, such as Alsweed (1996, 2000 and 2005) and Al-Qahtani (2001), only explored the frequencies of use without examining perceptions towards this use of word solving strategies. While the current study focused on examining both frequencies and perceptions towards the word solving strategies.

3.12 Summary of this chapter

In this chapter, language learning strategies, including vocabulary learning strategies, have been discussed. This discussion included the importance, definitions, classifications, and taxonomies of language learning strategies.

In addition, this chapter discussed word solving strategies, including details on the research on these. Key studies on vocabulary learning strategies frequencies and helpfulness have also been presented.

Finally, the factors that affect the choice of vocabulary learning strategies as well as the research methods of vocabulary learning strategies were explored. Vocabulary learning strategy instruction and its importance for L2 learner were also discussed.

Chapter Four: Research Methodology

Chapter Four: Research Methodology

4.1 Introduction

According to Wellington (2000: p.22), methodology is defined as “an activity or business of choosing, reflecting upon, evaluating and justifying the methods you use". Therefore, the main objective of this chapter is to detail:

- the research method,
- the research design,
- the research hypotheses,
- the research questions,
- its subjects,
- the research instruments used to collect data, and
- the procedure for implementing this study.

4.2 The research questions

This study attempts to answer the following research questions:

1- Are there statistically significant differences between the achievements of learners in the CALL multimedia classrooms and those in the traditional classrooms in the immediate and delayed post-tests?

2- What attitudes do learners in CALL multimedia classrooms have towards using CALL multimedia for vocabulary learning?

3- What are the most, and least, frequently used word solving strategies in CALL multimedia classrooms, when compared with traditional classrooms, as reported by the students?

4- What are the most, and least, helpful word solving strategies in CALL multimedia classrooms, when compared with traditional classrooms, as reported by the students?

5- Is there a statistically significant difference between the reported frequencies of word solving strategies used by learners in the CALL multimedia classrooms and learners in traditional classrooms?

6- Is there a statistically significant difference between the reported perceptions of the helpfulness of word solving strategies by the CALL multimedia and traditional learners?

7- Does frequency of use with regards to word solving strategies, significantly correlate with perceptions regarding its helpfulness in both CALL multimedia and traditional classrooms?

4.3 Rationale for mixed methods dimension

According to Gall et al. (1996), both qualitative and quantitative research can assist educational researchers. In social science research, Kvale (1996) asserts that there are two principal research methods - qualitative and quantitative.

Johnson and Onwuegbuzie (2004: p.14) state that " The goal of mixed methods research is not to replace either of these approaches (quantitative and qualitative) but rather to draw from the strengths and minimize the weaknesses of both in single research studies and across studies". Sieber (1973) believes that combining qualitative and quantitative research is very useful. He lists some reasons to show how such a combination can be effective at various stages of the research. In particular, at the data analysis stage, qualitative data can play a significant role in validating, interpreting

and describing quantitative results. Rossman and Wilson (1985) state another reason for supporting such a combination. They state that the combination of research methods provides richer data. Further, it has been recommended that in learning strategy research, the research should adopt different data collection methods as each different method may lead to different findings (Oxford & Crookall 1989; O'Malley & Chamot 1990). Oxford & Crookall (1989: p.414) state that "researchers should, whenever possible, use multiple methods (qualitative and quantitative) for gathering and validating LLS data. For example, they can employ a survey combined with interviews or think-aloud procedures." Bell (2005: p.6) states that “The approach adopted and the methods of data collection selected will depend on the nature of the inquiry and the type of information required.” Nick (2000: p.121) neatly sums up the dichotomy: “Quantitative research aims to show *what* is happening. Qualitative research, on the other hand, sets out to tell you *why* it is happening.”

In this study, the researcher utilised methods from both quantitative and qualitative research. Quantitative research methods were used with regard to students' achievements, attitudes and frequencies of word solving strategies and its helpfulness perceptions. In order to answer the research questions as well as test the hypotheses of the study regarding students’ achievements and improvement of vocabulary learning strategy use and perception, numerical data were collected and analysed. The first, fifth and sixth research questions were analysed by running t-tests. Also, the frequencies and perceptions of word-solving strategies and the attitude research questions were answered through calculating the means and standard deviations, with a quantitative analysis too.

Previous relevant research on students' achievements and learning strategies used quantitative techniques to measure any change or improvement (e.g. Almekhalfi, 2006; Aljarf, 2007; Alsweed, 1996).

Qualitative research methods were used alongside the quantitative method to support and interpret the quantitative results of the students' attitudes towards CALL and their reports of using their most used strategies, as there was no overall difference between the two groups, with regard to the most used strategy.

This method enabled the investigator to gain a deeper insight and to interpret the data more thoroughly than would have been possible through statistical analysis alone. Dawson (2009: p.20) states that

> "You might want to think about combining both qualitative and quantitative research, which is called triangulation. Many researchers believe this is a good way of approaching research as it enables you to counteract the weaknesses in both qualitative and quantitative research."

4.4 Motivation of this study

Previous studies on CALL multimedia indicated that it is effective for vocabulary learning. Furthermore, previous studies on vocabulary learning strategies, particularly word-solving strategies, found that they help L2 learners to overcome the challenge of unknown words. Saudi students' low level of English, in the secondary school stage, was identified as having several causes (Al-Akloby, 2001). One key issue is vocabulary presentation in the classroom and the lack of training for students for using vocabulary-learning strategies properly.

Therefore, for this research it was thought that changing the method of presenting vocabulary by replacing the traditional method with a CALL multimedia presentation approach would draw the students' attentions to the target vocabulary and would help them learn and practise more effectively than by using the traditional methods.

Also, supporting this presentation with activities or exercises that allow students to use vocabulary-learning strategies with unknown words, in an environment supported with CALL, should result in better improvement.

By making comparisons, it will be possible to observe any improvements in the students' level of vocabulary knowledge and use of vocabulary learning strategies in the two different learning environments. This is the main justification for an experimental approach.

4.5 Study protocol

To achieve the goals of this study, the following twenty steps were followed:

1- Review the literature on language learning strategies, with a focus on vocabulary learning strategies and computer assisted language learning.
2- Design a pre-questionnaire that helped to create an initial profile of subjects regarding vocabulary learning strategies' training and use of word-solving strategies in their previous educational stages.
3- Also, design a pre-test as the basis for determining whether or not the participants are equivalent in their vocabulary knowledge.

4- Design a post-questionnaire part (1) that helps to identify the frequency use of word solving strategies and to rate its actual helpfulness in the two different learning environments.

5- Also, design immediate and delayed post-tests to measure the vocabulary knowledge improvement after the study and make comparisons between the two groups.

6- Create PowerPoint slides that contain the target vocabulary with explanations in the form of combinations of text and pictures.

7- Create activities designed by Hot Potatoes – an educational program - to allow the learners to practise the target words and to use word solving strategies while completing the tasks.

8- Select online dictionaries to be used in the study with the CALL group.

9- Design a post-questionnaire part (2) to identify the CALL group's attitudes towards using CALL for vocabulary learning.

10- Travel to Majmaah University, Saudi Arabia, to select the schools in which the study will be implemented.

11- Consult three experts in the field of applied linguistics, and one Professor of Statistics to validate the questionnaire designs.

12- Follow their suggestions and make appropriate modifications.

13- Conduct a pilot study with thirteen students who will not be asked to participate in the experimental study.

14- Check the school's laboratory to ensure that it is equipped with the necessary materials e.g. computers, the internet, overhead projectors and smart boards.

15- Select students in the first year of the English Department, ensuring that they are equivalent in both schools.

16- Calculate the reliability of the questionnaires.

17- Design the consent forms in terms of ethical considerations.

18- Obtain permission from the university to implement the study.

19- Translate the questionnaires into Arabic and English.

20- Give the participants an instructional presentation on vocabulary learning strategies to ensure they are aware of them during the implementation of this study.

4.6 Research method

As the researcher is looking to investigate the effectiveness of CALL multimedia on the students' achievements, their word solving strategies' frequencies and their perceptions of its helpfulness, the current study adopted a quasi-experimental method as it was not possible to assign learners randomly into two groups by the researcher though the students, who met the requirements of acceptance in the university, were assigned into classrooms randomly by the Deanship of Admission and registration as confirmed by Mr. Yousif Auaish – head of registration in the Deanship of Admission and Registration and by the Dean of Community College.

Ross and Morrison (2007: p. 38) suggest that "Oftentimes in educational studies, it is neither practical nor feasible to assign subjects randomly to treatments. Such is especially likely to occur in school-based research, where classes are formed at the start of the year. These circumstances preclude true-experimental designs while allowing the quasi-experiment as an option".

4.7 Research design

The design of this study was based on the Pretest/Posttest Nonequivalent Control Group Design - the quasi-experimental design – to test the hypotheses of this study. Cohen et al. (2007) stated that this design is one of the most commonly used quasi-experimental designs. According to Sevilla et al. (2007), the Nonequivalent Control Group Design is widely used in educational research. "It is commonly used in groups naturally assembled such as those in classrooms. Two classes are picked as the two groups". (p.145)

This design is similar to the Pretest/Posttest Control Group design, but without assigning participants randomly. While in the true experimental designs, participants are randomly assigned. According to Gay (1976), this type should consist of at least two groups. Fisher and James (2002) indicate that as the participants are not randomly assigned, selection bias can be examined by pretesting the two groups to ensure their equivalency before the implementation of the study.

Tuckman (1994) states that the existence of a control group supports the belief that the change in the experimental group performance refers to the treatment. To test the hypotheses of the study, the table 4.1 below presents the data collection instruments that have been considered.

Table 4.1: The experiment design of the study

Instrument	**Experimental group** (CALL multimedia	**Control group** (traditional method)

	method)	
Pre-test	√	√
Pre- WSS use questionnaire	√	√
Immediate post-test	√	√
Post-WSS use questionnaire	√	√
Delayed post-test	√	√
WSS helpfulness perception	√	√
Interview	√	---

4.8 Study variables

4.8.1 Independent variable

Johnson & Christensen (2008) and Al-Asaf (2000) define the independent variable as the cause which is manipulated by the researcher for the purpose of knowing its influence on the dependent variable. Sevilla et al. (2007: p.138) suggests that "in an experimental study, the researcher manipulates at least one independent variable, controls other relevant variables, and observes the effect on one or more dependent variables". However, in this current research, the CALL multimedia classroom is the independent variable.

Learners, in the CALL classroom, were introduced to an attitude questionnaire, and interviewed to explore their attitude towards this independent variable.

4.8.2 Dependent variables

Tuckman (1994: p.98) defines a dependent variable as a factor which is "measured following the independent variable to determine the presumed effect of the independent variable". In this study, there are three dependent variables:

1- Vocabulary achievements tests.
2- Frequencies of word solving strategy use, and
3- Helpfulness perceptions of word solving strategies.

4.8 Control of Extraneous variables

According to Obydat (2003), it is the cancellation of the effect of all variables other than the independent variables that might affect the observed phenomenon. Borg et al. (1993) described the internal validity as the degree to which an experiment design controls extraneous variables. Therefore, the following steps were followed to control the extraneous variables:

1- Gay (1976) stated that the researcher should make sure that the groups are equivalent on all dependent variables. Therefore, to control the confounding variables the researcher pretested the students' knowledge of the target words and also explored their awareness and background of vocabulary learning strategies.
2- Tuckman (1994) mentioned that variables other than independent variable could also be controlled by equating across groups or otherwise elimination. The equating across groups process has been assured with regard to the following variables:

a. The nature of the subject: both groups were taught the same subject – Vocabulary Building (1) and the same topics. This subject is compulsory for all English students in both Colleges.
b. The researcher held meeting with the teachers in the two schools and explained the aim and procedure of this study and the topics that suit the current study. Both teachers hold an MA in Applied Linguistics and taught English for more than three years.
c. The researcher confirmed that the laboratory has a computer connected to the Internet for each student in the experimental group.
d. The researcher made sure that each student in the control group had his own textbook of the Vocabulary Building (1), pen, paper dictionary and notebook. However, the researcher brought printed copies of the two lessons and paper dictionaries in case a student forgot to bring the textbook with him to the class.
e. The researcher explained to the control group the importance of not having any kind of electronic dictionaries as they are representing a control group in a traditional classroom.
f. As there were midterm assessments, the researcher was concerned that some students drop out during the experiment, therefore the researcher decided to shorten the period of the experiment. Such actions limit the influences of the validity threat in question (Ross and Morrison, 2007).

4.9 The hypotheses of the study

1- There is no significant difference (at the .050 level), between the achievements of learners in CALL multimedia classrooms and the achievements of learners in traditional classrooms, with regards to learning L2 vocabulary.
2- There is no significant difference (at the .050 level), between learners in the CALL multimedia and traditional classrooms with regards to the overall reported frequencies regarding the use of vocabulary learning strategies.
3- There is no significant difference (at the .050 level), between the overall perceptions regarding the helpfulness of word-solving strategies in the CALL multimedia and traditional classrooms.

4.10 Participants

The participants of this study were 67 male Saudi students who were majoring in English and who were enrolled in their first year of the BA degree in the Community and Administrative Sciences and Humanities Colleges at Majmaah University in Majmaah City, KSA. The average age was between 19 and 20 years old. All participants had studied English for six years during previous educational stages. So, the homogeneity between groups was assured.

The study aims to investigate two groups who were assigned into classes at the beginning of the semester. These classes were selected at random. The first group consisted of 31 students from the Community College representing the CALL group (the experimental group) as this college is supplied with modern laboratory. The second group consisted of 36 students from the Administration and Humanities Sciences College representing the Traditional group (the control group). Both colleges

have the same English departments with the same plan of teaching, and are located in Majmaah City. In both colleges, all students are taught the same curricula.

4.11 Research instruments for collecting the data

In this study, pre, immediate and delayed post-tests, written questionnaires and oral interviews were the main instruments for collecting the necessary data. Neale, Thapa and Boyce (2006) mention that the use of multiple methods (e.g. questionnaires, surveys, interviews and observations) allows the researcher to present the collected data in such a way as to provide the complete story. Also, Al-Shuwairekh (2001) states that using more than one method to collect data is very useful.

Several scholars (e.g. Cohen, 1987 and Cohen & Hosenfeld, 1981) state that learning strategies are internal mental processes, and are not directly observable behaviours; their description and identification have, to a great extent, relied on participants' reports (Gallo-Crail and Zerwekh, 2002). However, most language strategy research has favored the use of surveys and questionnaires since information can easily be collected from a large number of learners, and the analysis is uncomplicated (e.g. Cohen, 1998; O'Malley & Chamot, 1990; Oxford, 1990 & 1996).

4.11.1 The questionnaire design

According to Oppenheim (1994: p.10), a questionnaire is "…a scientific tool and therefore must be constructed with great care in line with the specific aims and objectives of the investigation". The researcher designed the questionnaire for this study after reading and reviewing the various literature related to his study.

Cohen et al. (2007), Denscombe (2007) and McDonough and McDonough (1997) state some of the advantages of using a questionnaire. They describe it as being economical and easier to arrange than other methods. Also, it is a time saving method. On the other hand, they state some disadvantages, for example the structure of the questionnaire can lead to answers that reflect the thinking of the researcher rather than that of the respondents. Also, the participants may find it difficult to remember what has happened in the past, therefore their responses may mot be accurate. The questionnaire was translated into Arabic (the mother tongue of the students) to make sure that all questions were clear to them.

The researcher designed two written questionnaires, (pre- and post- questionnaires). The first version questionnaire aimed to explore the initial background with regard to the participants' training and use of vocabulary learning strategies in their previous educational stages (see Appendix 2). The second questionnaire was divided into two parts (see appendixes 5-6). The first part consisted of 10 questions about the five word solving strategies' frequencies and helpfulness perceptions.

One of the study's objectives is to investigate how frequently used, and how helpful the word solving strategies are perceived to be in two different learning environments. Therefore, a structured type of questionnaire was used to calculate the respondents' answers. According to Oppenheim (1994), a structured questionnaire generates responses which allow the researcher to analyse the gathered responses statistically, and also allow the researcher to make comparisons between two or more groups.

Two questions were created for each strategy in the first part of the questionnaire (2). The first question asked the respondent to assess the frequency of his use of this strategy. Each question has five levels to assess its use. These levels are:

-Always (score as 4)

-Often (score as 3)

-Sometimes (score as 2)

-Seldom (score as 1)

-Never (score as 0)

The measurements of these levels for analysis purposes were:

-From 0 to .49 is never

-From .50 to 1.49 is seldom

-From 1.5 to 2.49 is sometimes

-From 2.5 to 3.49 is often

-From 3.5 to 4 is always

The second question for each strategy aimed to rate the helpfulness of the only reported used strategies. There were five levels for answering this question:

-Strongly helpful (scores 5)

-Helpful (scores 4)

-Not helpful (scores 3)

-Strongly not helpful (scores 2)

- Not sure (scores 1)

The last choice, '*not sure*', was designed for those cases where the respondent has forgotten the actual answer, or did not want to rate it. The measurements of these levels for analysis purposes were:

-From 1 to 1.49 is not sure

-From 1.5 to 2.49 is strongly not helpful

-From 2.5 to 3.49 is not helpful

-From 3.5 to 4.49 is helpful

-From 4.5 to 5 is strongly helpful.

The second part of the second questionnaire explores the students' attitudes towards using CALL multimedia for vocabulary learning. There were ten questions about their previous experience of using CALL and their attitudes about this experience. Each question has five levels to assess its use. These levels are:

-Strongly agree (scores 5)

-Agree (scores 4)

-Disagree (scores 3)

-Strongly disagree (scores 2)

- Not sure (scores 1)

Again, the last choice, '*not sure*', was designed for those cases where the respondent has forgotten the actual answer, or did not want to answer it. For analysis purposes, the measurements of these levels were:

-From 1 to 1.49 is not sure

-From 1.5 to 2.49 is strongly disagree

-From 2.5 to 3.49 is disagree

-From 3.5 to 4.49 is agree

-From 4.5 to 5 is strongly agree.

4.11.1.1 The validity of the questionnaire design

Validity has been defined as the extent to which a measurement measures what it is intended to measure (Abedat et al., 2000). Alsharari (2010) states that there are several types of validity:

-Content validity

-Face validity

-Prediction validity

-Construct validity

These types are assessed in different ways. With regard to content validity, it is assessed based on the opinions of experts with regard to the questionnaire content. Therefore, after designing the first drafts of the questionnaires, the researcher consulted experts in the field of study to ascertain their opinions as to whether or not the researcher had addressed all the relevant issues, and whether the questions had been formulated in an unambiguous and understandable way. These experts were a professor of statistics, three Arab assistant professors of applied linguistics and the researcher's PhD supervisor Professor Steve Higgins.

4.11.1.2 The reliability of the questionnaires

The reliability coefficient of the questionnaire was calculated. Nunnally (1978) and Devellis (1991) stated that if the Cronbach's Alpha is equal to, or greater than .70, the

reliability of the questionnaire is good. However, low reliability coefficients of .50 were acceptable in earlier research. In this research, the reliability coefficient of part one of the post-questionnaire was found to be .703, which led to the claim that the questionnaire is reliable and ready for administration as presented in Table 4.2:

Table 4.2: Reliability Statistics of post-questionnaire (2/1)

Cronbach's Alpha	N of Items
.703	10

With regard to the reliability coefficient of the attitude questionnaire, the Cronbach's Alpha was found to be .828, which was also reliable and ready for administration as presented in the following table 4.3:

Table 4.3: Reliability Statistics of attitude- questionnaire (2/2)

Cronbach's Alpha	N of Items
.828	10

Also, the reliability value of the pre-questionnaire, as shown in the following table 4.4, was found to be .76, which is also acceptable.

Table 4.4: Reliability Statistics of pre-questionnaire

Cronbach's Alpha	N of Items
.76	6

4.11.1.3 Distribution of the questionnaire

According to Cohen and Manion (1994), there are three ways of distributing questionnaires:

1- Self–administration: directly to participants and completed in private and anonymously.

2- By mail: by posting the questionnaire to a group of people. However, this is expensive if large number of participants is involved.

3- Group administration: questions included in the questionnaire are discussed by group of people together.

In the current study, self-administration was used as it was the easiest and most time saving method. Also, it achieved the goal of this study.

4.11.2 Vocabulary achievements tests

As one of the objectives of the study was to investigate the effectiveness of the CALL multimedia classroom on the students' achievements, the researcher designed the pre- and immediate and delayed post-tests around a number of target words. The pre-test included the 50 target words from the two vocabulary lessons that were part of the curriculum (see Appendix 1), in which the participants were asked to translate the target words into Arabic. The immediate and delayed post-tests were similar to the pre-tests in terms of design.

Also, these tests will enable the researcher to calculate the effect sizes in the immediate and delayed post tests which needs to determine means and standard deviations similar to the effect size calculations mentioned in Chapter Two. Large effect sizes were found in some of these studies.

4.12 Pilot study

A small-scale pilot study was conducted with thirty volunteers prior to the main study to check the feasibility, and/or to improve the research design, namely the questions included in the questionnaires, the Hot Potatoes activities and the PowerPoint slides design. Also, it helped the researcher to add anything to the experiment that might have been missing. It also helped the researcher to adjust the timeline of the study. The volunteers were students taken from the relevant population, but not those who would be participating in the actual research, in order not to influence the later behavior of the research participants. Both teachers, participated in this study in the Community College and the Administrative Sciences and Humanities College, attended this pilot study.

4.13 The Pre-questionnaire about the word-solving strategies background

As stated earlier, this questionnaire was designed to create an initial profile about the participants' backgrounds in terms of their previous VLS training and use of word-solving strategies. Also, it helped the researcher to make sure that the students in the two colleges were equivalent in their previous use of the word solving strategies.

After administering this questionnaire to the students, the descriptive statistics were run to measure the mean scores of the students' reported previous use of the word solving strategies related questions - see Table 4.5:

Table 4.5 : Descriptive statistics of strategies (WSS) use of each group

Strategy	Traditional Group		CALL group	
	M	SD	M	SD
Ask teacher	2.89	1.03	2.65	.877
Skipping	1.25	1.02	1.77	1.23
Guessing	3.14	.961	2.68	1.30
Dictionary use	1.81	1.14	2.00	1.23
Ask classmate	2.39	.994	2.23	1.28
Total	**11.47**	2.18	**11.32**	3.10

As shown in the above table, it is clear that our participants have previously used the strategies and are familiar with most of them. Also, the total scores of the two groups indicate that there is a very slight difference between the two groups in terms of their previous background and use of the word solving strategies.

The CALL group's mean is 11.32 and the Standard Deviation is 3.10, while the Traditional group's mean is 11.47 and the Standard Deviation is 2.18. This indicates that both groups are approximately equivalent in their previous use of word solving strategies.

Therefore, an independent sample t-test was run to see whether or not the difference in the means was statistically significant. Table 4.6 below presents the result of the significance test:

Table 4.6: Independent sample t-test of the two groups in the pre-questionnaire

Pre-Questionnaire	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	6.779	.011	-.231-	65	**.818**	-.14964-	.64880	-1.445-	1.14610
Equal variances not assumed			-.225-	52.824	**.823**	-.14964-	.66560	-1.484-	1.18549

Significance on .050 level

As we can see from the Table 4.6 above, the difference between the mean scores of the two groups in terms of their previous knowledge and use of word solving strategies is not statistically significant. The significance value is .823; this is higher than the .050 level of significance which means that both groups are equivalent with regard to their previous use of word-solving strategies.

To help make the decision on whether or not the participants needed an instructional presentation on how to effectively use vocabulary learning strategies, the researcher asked the students about their training in the use of vocabulary learning strategies during their previous educational stages. The first question of the pre-questionnaire shows that the participants needed an instructional presentation about word solving strategies use, even in the case of those students who reported that they had used these strategies, but without previous training. Table 4.7 shows the percentage of the yes/ no training question answers that the students reported.

Table 4.7: Have you been trained to use vocabulary learning strategies in your previous educational stages?

Answer	Frequency	Cumulative Percent
No	58	86.6%
Yes	9	13.4%
Total	67	100.0

As shown, 86.6% of the participants reported that they had not received any specific training on the use of vocabulary learning strategies. This result supports Al-Qahtani's (2005) findings. His participants, similar to these, reported that they had no previous training or teaching on vocabulary learning strategies. Therefore, it was thought appropriate to provide the students with an instructional presentation about vocabulary learning strategy use, supported with examples, and the researcher arranged this with the teachers who participated in the study. This action was done to validate the results of this study after implementing it.

The researcher recognizes that although this one training session was not sufficient to teach all the strategies to the participants, it did ensure that they were aware of the potential uses of all the selected strategies used during this research. The training session explained the importance of vocabulary learning strategies, particularly the word-solving strategies, and how the student can make effective use of them when learning new words.

4.14 Pre-test results

The vocabulary pre-tests were administered after the participants completed the pre-questionnaire. The pre-tests scores were then compared with their achievements in the immediate and delayed post-tests to ascertain whether or not there had been an

improvement in their vocabulary knowledge, and to test whether or not any improvement was related to the learning environment. The descriptive statistics were used to calculate the mean scores of the pre-tests. Table 4.8 presents the total scores the two groups achieved.

Table 4.8: Descriptive statistics of pre-tests result

Test	Group	N	M	SD
Pre-test	CALL	31	51.38	1.47
	Traditional	36	50.97	1.20

As shown in the above table, the CALL groups' mean score was 51.38 and the standard deviation was 1.47, while the traditional groups' mean score was 50.97 and the standard deviation was 1.20. The following table 4.9 presents the independent sample t-test result to see whether or not the difference between them is significant.

Table 4.9: Independent Samples Test for the means of the pretest

Independent Samples Test											
		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
Pretest	Equal variances assumed	3.894	.053	1.266	65	**.210**	.41487	.32778	-.23-	1.06
	Equal variances not assumed			1.247	58.00	**.217**	.41487	.33276	-.25-	1.08

As shown in the above table, the difference is not statistically significant at the .050 level of significance. The p value is (.21). This means they can be considered equivalent in their vocabulary knowledge.

4.15 The setting of the study

The study was conducted in two schools of Majmaah University (see Section 1.4.3 for more details). The first school was the Community College. In this school there are two laboratories. Each lab is fitted with a master computer for the lecturer, and about 50 computers linked to the internet for students. There is also a smart board and an overhead projector. Therefore, it was suitable for the students of this school to represent the CALL group.

The second school was the Administrative Sciences and Humanities College, where traditional classrooms are available. Each classroom is equipped with tables, chairs and a whiteboard. Therefore, it was suitable for the students of this school to represent the traditional group.

4.16 Procedure

The researcher and the teachers selected two lessons from the Vocabulary Building (1) module from the first level of the BA programme offered by the English Department in Majmaah University (see Appendixes 11-12). The aim of this module is that, each week, students are expected to learn a number of words related to a specific subject such as shopping, doctors and hospitals, banking, education … etc.,

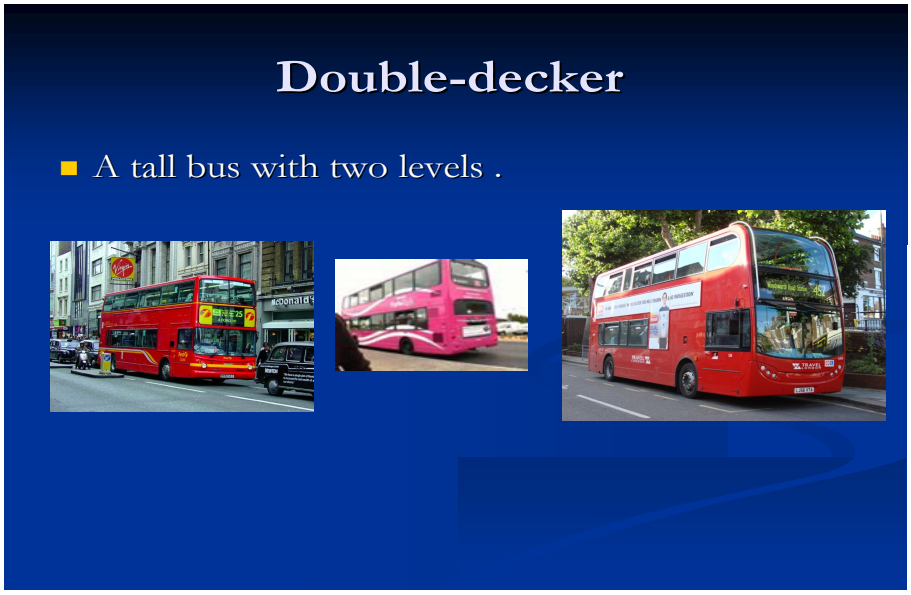
and then practice these words by answering multi-choice questions, matching, defining and/or filling in gaps in a comprehension passage.

The teacher of this module is free to select any lesson, from the course book, for each week. Before the teaching sessions, the researcher administered the pre-questionnaire and the pretest to the participants.

4.16.1 Procedure in the CALL class (experimental group)

All vocabulary lessons were designed on PowerPoint slides. The teacher taught the lessons in the laboratory, using a computer and also by showing the PowerPoint slides using an overhead projector onto a smart whiteboard.

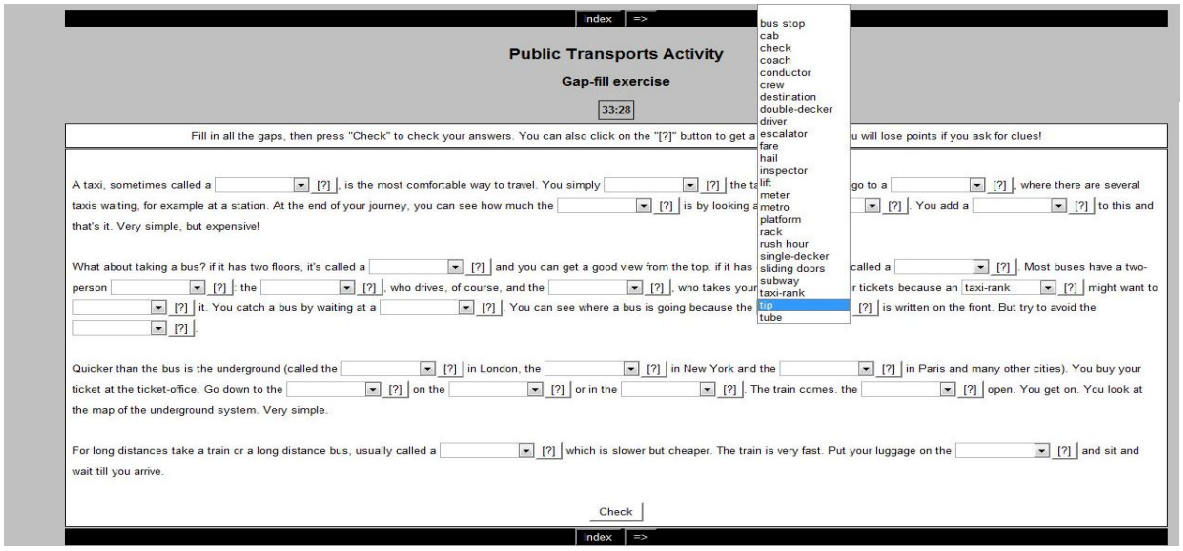
The PowerPoint slides included the target words with their definitions in English. Some definitions and pictures were provided, as suggested by Moreno & Mayer (2000) in Section 2.11.3. This helped the students to recognize the meaning of the target words as shown in the slide below (see other slides in Appendix 8).



The teacher also used free online dictionaries to give the learners opportunities to hear the pronunciation from sound recordings by native speakers. In the event that a student needed to listen to the pronunciation more, or to learn the meaning of new words, he was able to access the internet from his PC and hear the words several times from the online dictionaries.

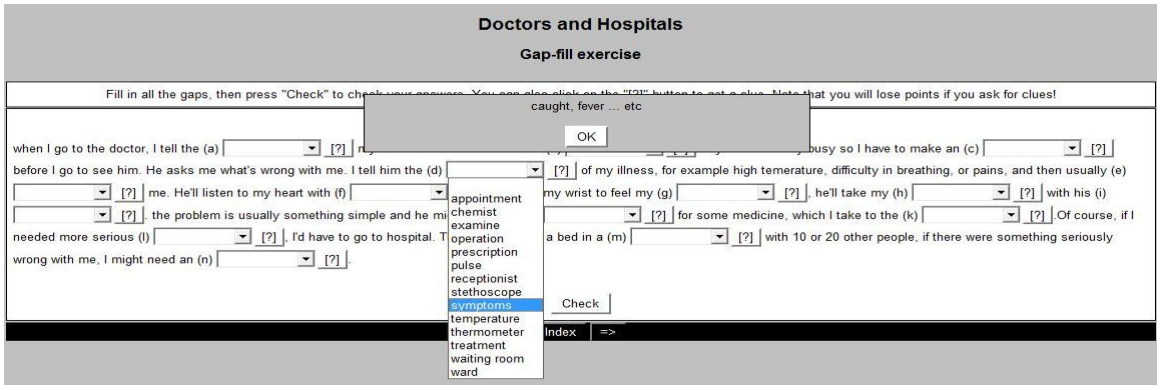
After explaining the target words, students were introduced to an activity designed by Hot Potatoes – an educational program - in which they were required to fill in gaps with suitable words from a dropdown list that appeared as part of the activity (see figures below). The students had to answer the task in a fixed time, as shown in the following figure. The student can use any vocabulary learning strategy to help him to choose the right answer and to overcome any unknown words that might not help him understand the meaning of the sentence.

Figure 4.1: Vocabulary activity related to the Public Transport lesson



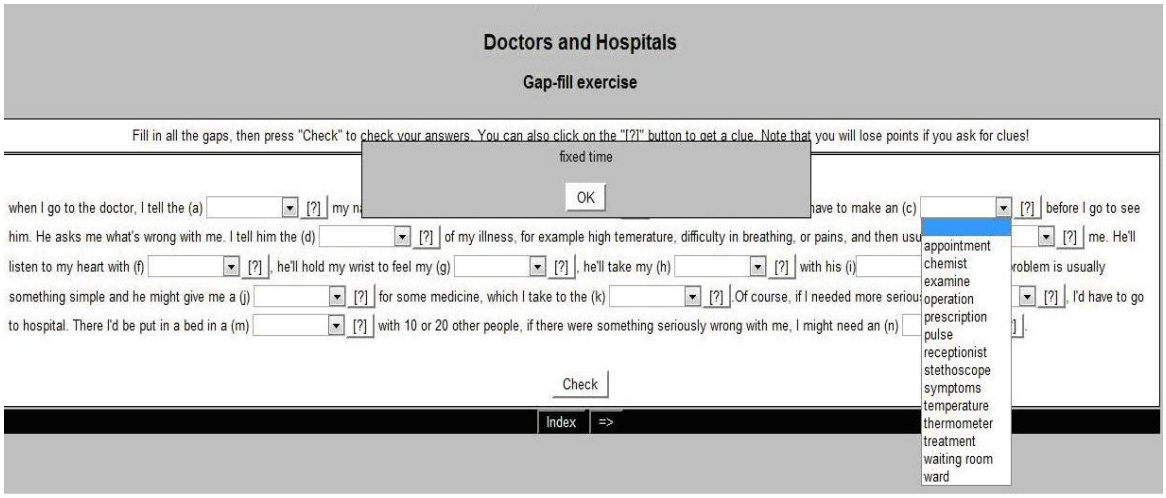
The dropdown list includes all the words that a student has to choose from. The student can receive clues by pressing on the icon [?] to get a synonym, definition or keyword to the correct answer, as shown in the following figures. For example, the student has been given some keywords clues (e.g. caught and fever) for the answer 'symptoms':

Figure 4.2: Vocabulary activity related to the Doctors and Hospitals lesson



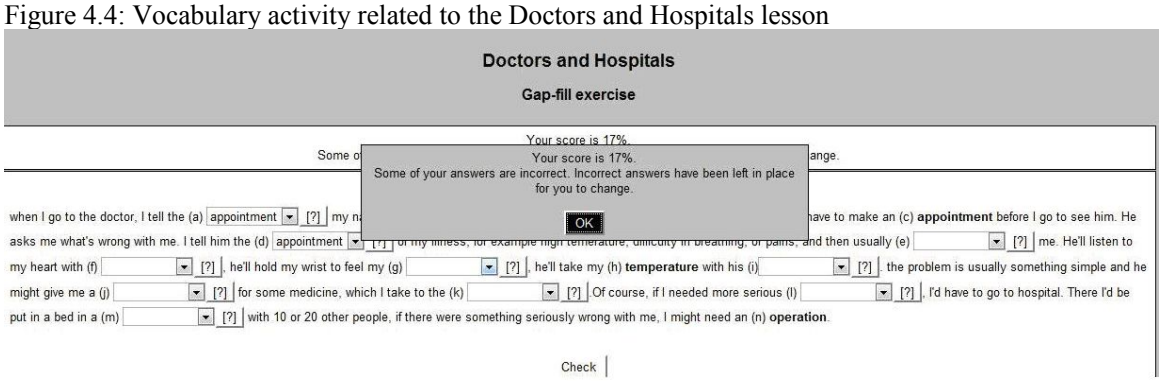
The figure 4.3 below shows the definition for the answer 'appointment' as a way to help the student select the proper answer that completes the sentence.

Figure 4.3: Vocabulary activity related to the Doctors and Hospitals lesson



Each student can get immediate feedback by pressing on the button *'check'* to obtain the percentage of the correct answers at any time, and can try to correct his answers again as shown in the figure 4.4 below:

Figure 4.4: Vocabulary activity related to the Doctors and Hospitals lesson



After teaching all these lessons, the researcher administered questionnaire (2). This questionnaire had two parts. Both groups were asked to answer the questions in the first part and report about their frequency of use of and the helpfulness perception towards word solving strategies while learning the new words and answering the tasks (see Appendix 5).

The second part of questionnaire (2) was only relevant for the CALL group, requiring them to report about their attitudes and beliefs with regard to learning vocabulary in a CALL environment. Also, an immediate post-test was distributed to measure any improvements in their vocabulary level. It was similar to the pre-test, but each lesson has a separate immediate post-test. In other words, after the lesson of Doctor and Hospital, the immediate post-test was only concerned about the 25 words related to this lesson. The same thing was done after the second lesson. The delayed post-test included all 50 words.

4.16.2 Procedure in the traditional class (control group)

The procedure, in the traditional class, was the same as that applied in the CALL class, but using the more traditional methods of teaching and learning. The teacher used a whiteboard and books to teach the lessons, and the students had notebooks, books, pens, paper dictionaries etc. to help them to learn the words and answer the activities that were printed on papers.

The researcher explained to traditional group that in this study they were representing a traditional group - the other group, representing the CALL group, could use e-dictionaries. Therefore, in order to allow a true comparison, they were asked not to use any kind of e-dictionaries, either portable or via their mobile phones. The students understood this and agreed not to use them.

After the teaching sessions, the researcher administered only questionnaire (2) part (1) to this group. This was concerned about the frequency and the perceptions of helpfulness of word solving strategies to learn the new words, and to do the tasks. The

traditional group was asked to answer the immediate post-test after each lesson, which was also similar to the design of the pre-test of the CALL group.

After the completion of questionnaire (2) and analyzing it, the researcher decided to invite the CALL participants to voluntarily participate in an individual oral interview. Only five CALL students agreed to participate. During these interviews, the students were asked about their most used strategy and their attitudes towards CALL.

The interviews were held with each student individually and were in Arabic. The researcher wrote down each student's answers on a separate sheet of paper.

Five questions were asked in the interview (see Appendix 14). Two weeks after the teaching sessions, a delayed post-test was administered to the learners to measure their long-term retention. It was similar to the design of the pre-test.

4.17 Summary of the strength and weakness points of the research design of this study

The design of this study has some strengths and weaknesses that should be identified. Regarding the points of strength, the researcher avoided the shortcomings of some studies, which investigated the effect of multimedia presentations on students' vocabulary learning, and followed what other writers, such as Yoshii (2002), suggested, such as using a between-subject design. In the current study, two groups were participated as the sample of the study.

Also, previous studies investigated the frequencies of word-solving strategies use during reading (see Section 3.9), but did not investigate the learners' perceptions of helpfulness towards the reportedly used word solving strategies. Therefore, the researcher added questions about perceptions of helpfulness to the questionnaire design.

With regard to the weaknesses, there are some issues that should be mentioned here. Lack of true randomisation is one of the weaknesses in the research design in this study. The researcher was not able to assign the participants into two groups himself, as it was not easy to do so for several reasons. For instance, the study was conducted in the middle of the academic semester, so it is not easy to reassign the students or to modify the schedule. Furthermore, the Deanship of Admission and Registration only has the permission to accept students and then assign them to schools according to the university rules.

4.18 Analysis and discussion

After collecting the necessary data, the researcher used statistical software (SPSS 16) to analyze the pre and post achievements tests, and the pre- and post-questionnaires. The interviews were also analyzed qualitatively.

4.19 Validity and Reliability

As the mother tongue of the students was Arabic, the questionnaires were written in Arabic to ensure that they understood the questions and could choose the answers that

actually reflected their opinions. The interviews were also held in Arabic to help the students express themselves, and to answer the questions clearly.

As the participants of this study were students at Majmaah University in Saudi Arabia, permission was obtained from the university with regard to collecting data from the students (see Appendix 10). Also, when the students were informed about the study and asked to be participants, they were asked to sign on a consent form (see Appendix 4). Cohen et al. (2004) state that respondents should have the choice as to whether or not to take part in any research.

Also, they should be given assurances that their responses and information will be treated as confidential and anonymous at all times. Therefore, students were not required to write their names on the questionnaire so that anonymity was assured throughout the study. Ethical clearance was obtained before the experimental stage of the study was begun.

4.20 Summary of this chapter

This chapter describes the research method and design. Also, it showed the techniques and procedures that were followed in this study in order to gather the required data. Both qualitative and quantitative instruments were used in the study. The qualitative instruments were oral interviews.

The quantitative instruments were pre-tests, and immediate and delayed post-tests, pre- and post-vocabulary learning strategy questionnaires and an attitude questionnaire. The validity and reliability of the questionnaires were evaluated.

This chapter also describes how the subjects were selected, and how the equivalence of the groups was assessed with regard to the previous use of word solving strategies, along with their knowledge of the target L2 words. Moreover, the vocabulary lessons and the related activities, that the researcher and teacher selected, were presented. The PowerPoint slides and the Hot Potatoes activities, which were designed for the treatment group, have been described and illustrated. In addition, the procedures with regard to implementing the study have been discussed.

The following tables summarise each objective of the study, the related hypotheses and research questions, what data collection techniques provide answers for the research questions and how the gathered information will be analysed.

Table 4.10: the first aim and its related hypotheses, research questions and techniques of data collection and analysis

<table>
<tr><th colspan="4">Objective 1</th></tr>
<tr><td colspan="4">To investigate the effects of CALL multimedia classroom on the achievements of students with regards to L2 vocabulary learning and to compare these achievements to those of students in the traditional classroom.</td></tr>
<tr><td colspan="2">Related hypothesis</td><td>Related research questions</td><td>Method</td></tr>
<tr><td colspan="2">There is no significant difference (at the .050 level), between the achievements of learners in CALL multimedia classrooms and the achievements of learners in traditional classrooms, with regards to learning L2 vocabulary.</td><td>Are there statistically significant differences between the achievements of learners in the CALL multimedia classrooms and those in the traditional classrooms in the immediate and delayed post-tests?</td><td>Pre-test, immediate and delayed post tests</td></tr>
<tr><td rowspan="2">Data analysis techniques</td><td>Quantitative</td><td colspan="2">Paired samples t test, Mann-Whitney test (immediate test), descriptive statistics, independent t-test (delayed test); effect size calculations (Hedges’ g)</td></tr>
<tr><td>Qualitative</td><td colspan="2">n/a</td></tr>
</table>

Table 4.11: The second objective and its related hypotheses, research questions and techniques of data collection and analysis

Objective 2		
To investigate the effects of CALL on students' frequencies of reported word solving strategies use. This will be compared with students' in traditional classrooms.		
Related hypothesis	**Related research questions**	**Method**
There is no significant difference (at the .050 level), between learners in the CALL multimedia and traditional classrooms with regards to the reported frequencies regarding the use of word solving strategies.	Is there a statistically significant difference between the reported frequencies of word solving strategies used by learners in the CALL multimedia classroom and learners in the traditional classroom? What are the most and least frequently used word solving strategies in CALL multimedia classroom, when compared with traditional classroom?	Pre and post Questionnaire, interview
Data analysis techniques	Quantitative	Paired sample t test, Mann-Whitney test and descriptive statistics.
	Qualitative	Interview

Table 4.12: The third objective and its related hypotheses, research questions and techniques of data collection and analysis

Objective 3		
To investigate the effect of CALL on students' perceptions of helpfulness regarding these strategies. This will be compared with students' in traditional classrooms.		
Related hypothesis	**Related research question**	**Method**
There is no significant difference (at the .050 level), between the perceptions regarding the helpfulness of vocabulary learning strategies in the CALL and traditional environments.	Is there a statistically significant difference between the reported perceptions of the helpfulness of vocabulary learning strategies by the CALL multimedia and traditional learners? What are the most and least helpful strategies in CALL multimedia classrooms, when compared with traditional classrooms, as reported by participants? -Does frequency of use with regards to word solving strategies, significantly correlate with perceptions regarding its helpfulness in both CALL multimedia and traditional classrooms?	Questionnaire
Data analysis techniques	Quantitative	Descriptive statistics, Pearson Correlation and Mann-Whitney test
	Qualitative	N/A

Table 4.13: the fourth objective and its related research question and techniques of data collection and analysis

Objective 4			
To identify the attitudes of learners towards using CALL multimedia for vocabulary learning.			
Related hypotheses		**Related research questions**	**Method**
N/A		-What attitudes do learners in CALL multimedia classroom have towards using CALL multimedia for vocabulary learning?	Questionnaire, interview
Data analysis techniques	Quantitative	Descriptive statistics	
	Qualitative	Interview	

Chapter Five: Data Analysis

Chapter Five: Data Analysis

5.1 Introduction

In this study, both quantitative and qualitative data analyses were carried out. To answer the research questions, and to test the hypotheses of this study, as described in the fourth chapter, several qualitative and quantitative analytical procedures were followed. The qualitative data analysis refers to oral interviews with the students. The researcher did not fully transcribe the interviews. Instead, notes were taken regarding the interviewees' main ideas, and these were then elaborated summarized in a text (see Appendix 14).

The quantitative analysis refers to the written questionnaires and the pre-, immediate and delayed post-tests administered to the participants before and after the application of this study. The Statistical Package for Social Sciences (SPSS 16) was used to perform the following statistical procedures:

1- Descriptive statistics, including means, frequencies and standard deviations were carried out to summarize the learners' responses to the frequency of use of the pre and post word solving strategies, their helpfulness perceptions, their achievements and their attitudes towards learning vocabulary in the CALL multimedia classroom.

2- Paired sample t-test was run to see whether or not the change in the reported frequency use of word solving strategies before and after the study was significant for each group. Also, it was used to see whether or not the improvement in the vocabulary achievement tests after the study, for each group, was significant.

3- A nonparametric test, the Mann-Whitney test, was used to see whether or not the differences between the two groups regarding the reported strategy use and helpfulness perceptions were significant.

4- The Mann-Whitney test was used to see whether or not the difference between the two groups regarding the vocabulary achievements in the immediate post-test was significant.

5- An independent samples t-test was used to see whether or not the difference between the two groups with regard to their achievement in the delayed post-test was significant.

6- To obtain the correlations between the reported frequencies of word solving strategies and their perceived helpfulness by the two groups, Pearson Correlation value was calculated.

In addition, the estimates of the effect size in the immediate and delayed post-tests, based on Hedges' (1981) method, was assessed to investigate the impact of the intervention, (CALL multimedia), on the treatment group. A spreadsheet [2] was used to calculate this effect size.

The first section of this chapter presents the quantitative analysis results of the pre-, immediate and delayed post-tests and the estimates of the effect size. Then, the quantitative analysis results of the pre and post word solving strategies use along with its helpfulness perceptions are presented. The third section relates to the correlations between the frequency of word solving strategy use with their perceived helpfulness in each learning setting. Then, the analysis results of the attitude questionnaire will be presented. Finally, the qualitative analysis of the interviews with the five students is discussed. The researcher analysed these interviews and identified connections with the students' responses to the other related findings.

[2] http://www.cemcentre.org/evidence-based-education/effect-size-calculator

5.2. Vocabulary achievements of the two groups

Descriptive statistics were run to calculate the mean score of the immediate post-test, and the Mann-Whitney test was used to see whether or not the difference between them was significant. As stated above, post-tests were run to see the effect of the CALL multimedia classroom on students' achievements compared with the traditional classroom's. The mean scores of the pre and immediate post-tests of the CALL group are displayed in the following table 5.1:

Table 5.1: Mean scores of pre and immediate post-test scores for the CALL group

Paired Samples Statistics					
		M	**N**	**Std. Deviation**	**Std. Error Mean**
Pair 1	Pretest	51.3871	31	1.47597	.26509
	Immediate pos test	79.3226	31	4.39990	.79025

As shown in the above table, there is an improvement in the amount of learned vocabulary. The mean score of the immediate post-test is greater than the pre-test score. The score in the immediate post-test was 79.32 (SD. 4.39) which is greater than the score achieved in the pre-test (M=51.38, SD=1.47).

Paired sample t-test was run to see whether or not this difference was statistically significant. "This type of t-test is suitable when a single sample of participants is used more than once on the same dependent variable" (Jessica, 2007: p.6). The results can be seen in the following table 5.2.

Table 5.2: Sample t-test between pre- and immediate post-tests for the CALL group

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pretest – immediate post test	-2.793	4.91213	.88224	-29.73727-	-26.13370-	-31.664-	30	**.000**

Clearly, the difference between the two mean scores is statistically significant at the .01 level. With regard to the CALL learners' achievements in the delayed post-test, the following table 5.3 shows the mean score of the pre and delayed post-tests.

Table 5.3: The mean scores of the pre and delayed post tests for the CALL group

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	51.3871	31	1.47597	.26509
	Delayed post test	70.2258	31	4.58773	.82398

Interestingly, the score achieved in the delayed post-test (M=70.22, SD=4.58), by the CALL group, is greater than the pre-test score (M=51.38, SD=1.47). Therefore, a paired sample t-test was run to see whether or not the difference is statistically significant. The following table 5.4 presents the results:

Table 5.4: Paired Samples test for the difference between the pre-test and delayed post test for CALL group

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	pretest – delayed test	-1.883	4.899	.88000	-2.06	-1.70	-2.14	30	**.000**

The result indicates that the difference is statistically significant at the .01 level. With regard to the traditional group's vocabulary achievement in the immediate and delayed post-tests, the following table 5.5 presents the mean scores of the pre and immediate post-tests.

Table 5.5: Mean scores of pre and immediate post-tests scores for the traditional group

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	50.9722	36	1.20679	.20113
	Immediate post test	63.4444	36	4.48135	.74689

As shown in the above table, there is a significant improvement in terms of the extent of the vocabulary learned by the traditional group. The mean score of the immediate post-test (M=63.44, SD=4.48) is greater than the pre-test score (M=50.97, SD=1.20). Therefore, paired sample t-test was used to see whether or not the difference was significant as shown in the table 5.6.

Table 5.6: paired sample t-test results between pre and immediate post-tests for the Traditional group

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	pretest – immediate test	-1.24	4.42	7.37	-1.39	-1.09	-1.69	35	**.000**

As apparent in the above table, the result showed that the difference is statistically significant at the .01 level. Regarding the traditional group's delayed post-test achievement, the following table 5.7 shows the mean scores of the pre and delayed post-tests for them.

Table 5.7: Sample t-test results between the pre and delayed post-tests for the Traditional group

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	50.9722	36	1.20679	.20113
	Delayed post test	61.0000	36	3.24257	.54043

The score for the delayed post-test, (M=61, SD=3.24), is greater than the score of the pre-test (M=50.97, SD=1.20). The following table 5.8 presents the result of the paired sample t-test between the pre and delayed post-tests for the Traditional group:

Table 5.8: Sample t-test results between pre and delayed post-tests for the Traditional group

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	pretest – delayed test	-1.002	3.58	.598	-11.24-	-8.81-	-16.76-	35	**.000**

As shown above, the difference between the two tests is statistically significant at the .01 level. So, it is clear that both groups made a sizeable improvement in learning the target words. However, the CALL group's scores in the immediate and delayed post-tests were greater than the Traditional group's. Therefore, it would be useful to see whether or not the differences between the two groups are statistically significant. Before calculating the p value, the normality of distribution and homogeneity of variance were tested as shown in the below table 5.9.

Table 5.9: Normality and homogeneity tests' results of the immediate post test

Tests of Normality			**Test of Homogeneity of Variances**			
Statistic	df	Sig.	Levene Statistic	df1	df2	Sig.
.955	67	.017	.001	1	65	.972

The result indicated that the distribution of data was abnormal as the significance value was .017. With regard to the homogeneity of variance test, as shown in the table above, the significance value is .972, which is not significant. Therefore, this means that they are equal, and as the distribution normality value is less than .050 level, the independent samples t-test will not be used to calculate the p value. Instead, a nonparametric test, the Mann-Whitney test, will be used to calculate the p value. The

following table 5.10 presents the result of the Mann-Whitney test for the difference between the immediate post-tests for the two groups.

Table 5.10: Mann-Whitney test results for difference in the immediate post-tests between the groups

	Immediate test
Mann-Whitney U	4.000
Wilcoxon W	670.000
Z	-6.975-
Asymp. Sig. (2-tailed)	**.000**
a. Grouping Variable: CALL and Traditional	

As shown in the table above, the difference between the two groups with regard to the achievements in the immediate post-tests is statistically significant at the .01 level.

Also, it was important to see whether or not the difference between the scores achieved in the delayed post-tests by the two groups is statistically significant. The following table 5.11 shows the normality and homogeneity tests results:

Table 5.11: Normality and homogeneity tests results of the delayed post test

Tests of Normality			**Test of Homogeneity of Variances**			
Statistic	df	Sig.	Levene Statistic	df1	df2	Sig.
.077	67	.200	1.960	1	65	.166

As shown above, the results indicate that the data are distributed normally and the homogeneity of variances is equal. Therefore, an independent sample t-test was run to calculate the p value of the difference in the delayed test. The following table 5.12 presents the results:

Table 5.12: Independent sample t-test for the difference between the two groups in the delayed post test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	1.960	.166	9.60	65	**.000**	9.225	.960	7.307	11.144
Equal variances not assumed			9.36	52.96	**.000**	9.225	.985	7.249	11.202

Significance at .050 level

As shown above, the difference between the CALL and traditional groups regarding the achievements in the delayed post-tests is statistically significant at the .01 level.

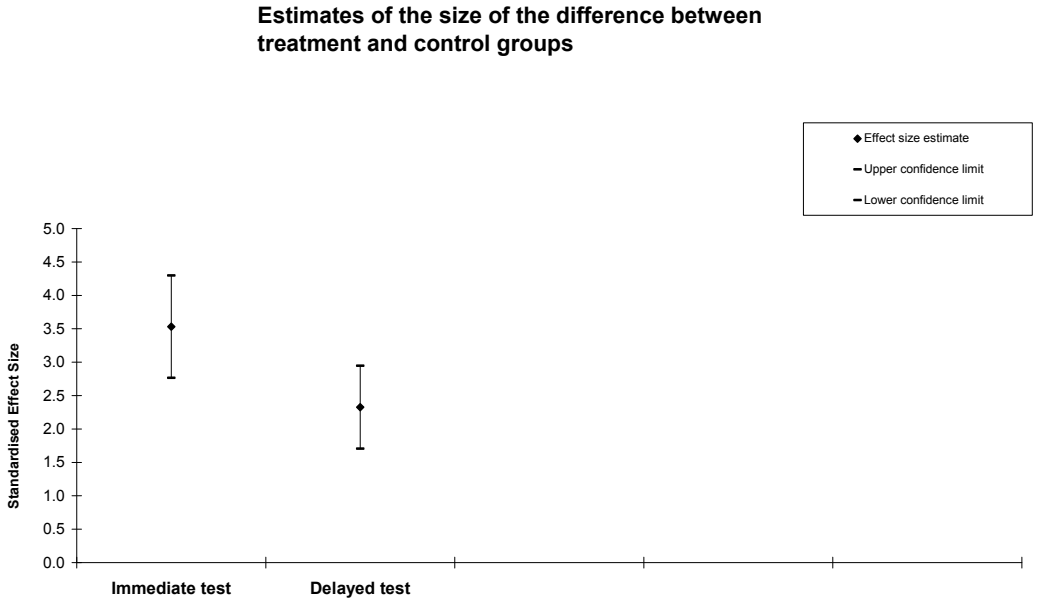
5.3 The estimates of the effect size

In this study, the effect size of both the immediate and delayed post-tests have been assessed, based on Hedges' (1981) method, using the standard deviation, and the two means have been compared. Table 5.13 presents the effect size estimates:

Table 5.13: The estimates of the effect size of the immediate and delayed post-tests

Post-tests	Treatment group			Control group			P value for mean diff (2-tailed T-test)	Confidence interval for effect size		Hedges' g effect size
	N	M	SD	M	N	SD		lower	upper	
Immediate post-tests	31	79.32	4.4	63.44	36	4.48	**0.00**	2.76	4.30	**3.53**
Delayed post-tests	31	70.22	4.58	61	36	3.24	**0.00**	1.71	2.95	**2.33**

Graph 5.1: The estimates of the effect size difference between the groups



As shown in the table 5.13 and Graph 1 above, the effect size value in the immediate post-tests is ES= 3.53 which is considered to be very large. Also, the effect size in the delayed post-tests is ES=2.33 which is also considered to be very large. Therefore, it is clear that the use of CALL multimedia classroom has a positive impact on the treatment group of students (CALL group).

5.4 Summary of this section

This section shows that the vocabulary achievements of the two groups improved after the teaching sessions. Also, it demonstrates that the CALL group learnt the target words better than the traditional group and that the differences, in the immediate and delayed post-tests, were statistically significant. This indicates that the CALL multimedia classroom has a significant effect on L2 vocabulary learning. Also, the

effect size assessments of the immediate and delayed post-tests showed that CALL multimedia classroom has a positive impact of the treatment group (CALL).

5.5 Post-questionnaire for the word solving strategies

5.6 Word solving Strategies (WSS): frequencies and helpfulness perceptions

A second questionnaire (Q2) was administered immediately after the teaching sessions to identify how frequently the participants used word solving strategies, and also to what extent they made use of them. This questionnaire consisted of 10 questions about the frequency of use and the helpfulness ratings of word solving strategies.

The descriptive statistics were then run to calculate the mean scores and the standard deviations of all strategies to determine in which learning environment the word solving strategies have been used to a high, medium or low extent. Oxford (1990) suggests three categorizations for scoring the use of vocabulary learning strategies. Scores below 2.49 indicate low strategy use, scores between 2.5 to 3.49 indicate medium strategy use, and scores above 3.5 indicate high strategy use.

Therefore, each strategy's frequency of use was assessed based on the mean scores and percentages determined by the responses to all the questions with regard to each strategy in the questionnaire, which asked the students to rate the frequency of use of the strategies (always, often, sometimes, seldom, never). The extent of the helpfulness of each strategy was also assessed, based on calculating the means of the respondents'

responses to the second question related to each strategy (strongly helpful, helpful, not helpful, strongly not helpful, not sure), in the first part of the second questionnaire.

By doing this, it is possible to determine the discrepancies between the frequency use and the helpfulness ratings of the vocabulary learning strategies in both learning environments. The following tables show the differences for each vocabulary learning strategy.

5.6.1 The Skip new words strategy

With regard to the skip new words strategy, both groups rank equally the use of this strategy, based on the mean scores and standard deviations. Both groups are categorized as being low strategy users. Table 5.14 shows the result of the descriptive analysis:

Table 5.14: Skip new words strategy

Type	Group	N	M	SD	Frequency	Percentage	Rank
Frequency use	CALL	31	1.97	.75	Sometimes	49.5%	Low
	Traditional	36	1.83	1.0	Sometimes	45.7%	Low

The mean score of the CALL group was 1.97 (49.5%) and the Standard Deviation was .75. The mean score of the traditional group was 1.83 (45.7%) and the standard deviation was 1.0. These results indicate that there is no discrepancy with regard to the frequency of use though the score was higher in the CALL multimedia classroom. Therefore, it would be interesting to find out how helpful this low use strategy really was. Table 5.15 shows the descriptive analysis results of the helpfulness rates:

Table 5.15: The mean scores of the helpfulness perception for skipping strategy

Type	Group	N	M	Perception	SD
Helpfulness perception	CALL	31	3.45	Not helpful	1.28
	Traditional	36	3.03	Not helpful	1.44

The mean score of the CALL group was higher than the mean score of the traditional group. The CALL group have rated the use of this strategy as not being helpful (M=3.45, SD=1.28). Also, the traditional group have rated the strategy as being not helpful (M= 3.03 SD=1.34). So, there is no difference between the two groups with regard to its perception of helpfulness.

5.6.2 The Ask a classmate strategy

The descriptive statistics results regarding this vocabulary learning strategy show that whether or not there is a difference between the two groups with regard to the ranking of frequency of use of this strategy. Table 5.16 presents the mean scores and the Standard Deviations with regard to the use of this strategy for the two groups:

Table 5.16: Ask classmate strategy frequency use mean scores

Type	Group	N	M	SD	Frequency	Percentage	Rank
Frequency use	CALL	31	2.45	.768	Sometimes	61.2%	Low
	Traditional	36	2.33	.926	Sometimes	58.2%	Low

The mean score on the part of the traditional group was 2.33 (58.2%) and the Standard Deviation was .926. This categorizes them as low users of the strategy. The mean score of the CALL group was 2.45 (61.2%) and the Standard Deviation was .768, which indicates that the use of this strategy by the CALL group is categorized as being low. Thus, there is no difference between the two groups in terms of use of this strategy.

By analyzing the perceptions of helpfulness, there is no difference in rating this strategy in terms of helpfulness by the two groups as shown in the Table 5.17 below:

Table 5.17: The overall mean scores in terms of helpfulness rates for Ask classmate strategy

Type	Group	N	M	SD	Perception
Helpfulness perception	CALL	31	3.23	1.56	Not helpful
	Traditional	36	3.03	1.57	Not helpful

Based on the mean scores for helpfulness, both groups rated this strategy as being not helpful. The mean score of the CALL group was 3.23 with 1.56 as the Standard Deviation, and the mean score of the traditional group was 3.03 and Standard Deviation was 1.57.

5.6.3 The Ask the teacher strategy

The results of the descriptive statistics, for the reported use of this strategy, are presented in Table 5.18:

Table 5.18: Ask the teacher strategy frequency of use

Type	Group	N	M	SD	Frequency	Percentage	Rank
Frequency use	CALL	31	**3.13**	.562	Often	78.2%	Medium
	Traditional	36	**2.94**	.715	Often	73.5%	Medium

As shown in this table, both groups are categorized as being medium strategy users with regard to the strategy of asking the teacher. The CALL group's mean score was 3.13 with .562 as the Standard Deviation. With regard to the Traditional group, they also used this strategy to a medium extent (M=2.94, SD=.715). Table 5.19 presents the perceptions of helpfulness for this strategy.

Table 5.19: The overall mean scores of the helpfulness rates for Ask the teacher strategy

Type	Group	N	M	Perception	SD
Helpfulness perception	CALL	31	4.81	Strongly helpful	.402
	Traditional	36	4.28	Helpful	.741

In terms of taking advantage of this strategy, the CALL group described their use of this strategy as being strongly helpful as shown in the Table 5.19. The mean score is 4.81 with .402 as the Standard Deviation. Concerning the traditional group, the mean score was lower than that of the CALL group. A 4.28 mean score with a Standard Deviation of .741, indicates that they rated this strategy as being helpful.

5.6.4 The Consult dictionary strategy

Table 5.20 shows the mean scores of the reported use of a dictionary by the two groups:

Table 5.20: Frequencies of consult dictionary strategy use

Type	Group	N	M	SD	Percentage	Frequency	Rank
Frequency use	CALL	31	3.84	.523	96%	Always	High
	Traditional	36	3.50	.655	87.5%	Always	High

The CALL and traditional groups both used this strategy to a greater extent. The mean score of 3.84 (96%), (SD=.523) is above 3.5, which is categorized as high strategy use in terms of the Oxford (1990) categorization. The mean score of the Traditional group, 3.5 (87.5%), (SD =.655), is also ranked as high strategy use. Therefore, it can be seen that there is no discrepancy between the two groups with regard to the ranking of use, though it is clear that CALL group used it more than the Traditional group.

Moving on to the helpfulness perception, both groups rated this strategy as being strongly helpful. Table 5.21 shows the mean scores in terms of helpfulness perceptions by the two groups:

Table 5.21: The overall mean scores in terms of helpfulness for consult dictionary strategy

Type	Group	N	M	SD	Perception
Helpfulness perception	CALL	31	4.94	.25	Strongly helpful
	Traditional	36	4.78	.422	Strongly helpful

The mean score of the CALL group was 4.94 and the Standard Deviation was .25, while the mean score of the traditional group was 4.78 with .422 as the Standard Deviation. Based on the qualitative data from the interviews, the CALL interviewees' responses, discussed below, will be linked in the discussion chapter with the quantitative analysis, to reveal the reason for this and how this strategy was used during the CALL lessons, and why they found it so helpful.

5.6.5 The Guessing from the context strategy

The Guessing from the context strategy was not a highly ranked strategy as shown in Table 5.22 below:

Table 5.22: Frequency of use of Guessing from the context strategy

Type	Group	N	M	SD	Frequency	Percentage	Rank
Frequency use	CALL	31	3.48	.626	Often	87.%	Medium
	Traditional	36	3.17	.811	Often	79.2%	Medium

The mean score of the CALL group was 3.48 (87%), and the Standard Deviation was .695, which categorizes this strategy as being of medium use. In addition, the Traditional group also ranked its use as being medium. The mean score was 3.17 (79.2%) and the Standard Deviation was .811. Therefore, there is no difference

between the groups in terms of ranking the use of this strategy. Also, no difference is seen with regard to rating their perceptions towards its helpfulness. Table 5.23 presents the mean scores of the helpfulness rates:

Table 5.23: The overall mean scores in terms of helpfulness for Guessing from the context strategy

Type	Group	N	M	SD	Perception
Helpfulness rates	CALL	31	4.42	.564	Helpful
	Traditional	36	3.89	1.304	Helpful

It is clear that both groups considered the guessing from context strategy as being a helpful strategy. The mean score of the CALL group is 4.42 (SD .564) and the mean score of the traditional group is 3.89 (SD 1.304). The mean score of the CALL group is higher than the Traditional group's.

5.7 The overall improvement of vocabulary learning strategy use by the two groups

Descriptive statistics were used to calculate the total mean scores of the participants in terms of their use of word solving strategies. Table 5.24, below, presents the overall mean scores of the reported frequency use of word solving strategies for the CALL group before and after the study.

Table 5.24: The overall mean scores of the frequencies of word solving strategies use by the CALL group

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Overall pre- use	11.3226	31	3.10255	.55723
	Overall post-use	14.8710	31	1.82102	.32707

As can be seen above, there is an increase in the reported frequency of using word solving strategies after implementing the study. The pre-questionnaire showed that the mean score of the reported use of word solving strategies was 11.32 (SD =3.10), while after the study their use was increased to 14.87 (SD=1.82). Therefore, a paired samples t-test was run to judge whether or not this improvement is statistically significant as shown in the table 5.25 below:

Table 5.25: Paired samples t-test between the pre and post-strategy use questionnaire for the CALL group

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		M	SD	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	total pre-use - post-use	-3.54	3.47	.62362	-4.82-	-2.27-	-5.69-	30	**.000**

As shown above, the CALL group's increase in the reported frequency of word solving strategies use is statistically significant at the .01 level.

With regard to the Traditional group, the following table 5.26 shows the mean scores of their frequency of use of word solving strategies before and after the study:

Table 5.26: Sample Statistics

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Total pre- use	**11.4722**	36	2.18418	.36403
	Post-use	**13.7222**	36	2.23749	.37291

As can be shown above, there is an increase in the reported frequency of word solving strategies use after the implementation of this study. Their reported use before the study was 11.47 (SD=2.18), while it was increased to 13.72 (SD= 2.23) after this study. Therefore, a paired sample t-test was run to see whether or not this difference is statistically significant

Table 5.27: Paired samples t-test results of the frequency use of WSS by the Traditional group

Paired Samples Test								
	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 total pre- use - post-use	-2.25	2.86	.477	-3.21-	-1.28-	-4.71-	35	**.000**

Interestingly, the difference here between the Traditional group's reported use of the strategies is also statistically significant at the .00 level. Despite both groups reporting a significant improvement in the strategies use, the overall improvement of the reported frequency of strategy use by the CALL group, as we can see in the below table 5.28, is greater than the Traditional group's.

Table 5.28: Overall means of the reported use of strategies after the study by the two groups

Group	**Stage**	**Overall Use of strategies**
CALL	Post-study	**14.87**
Traditional	Post-study	**13.72**

To determine whether or not the difference between the two groups' improvements, after the application of this study, is statistically significant, the p value was calculated. Before determining which test would be used, the normality of

distribution and the homogeneity of variances were assured. The following table 5.29 shows the results:

Table 5.29: Normality test and Homogeneity of Variances of the post WSS questionnaire

Test of Homogeneity of Variances				**Normality Test**		
Levene Statistic	df1	df2	Sig.	Statistic	df	Sig.
2.001	1	65	.162	.950	67	.009

The significance value, using the Shapiro-Wilk test, showed it to be .009, which means that they are not normally distributed. With regard to the homogeneity of variance, the Levene value is 2.001, which is not significant at the 050 level (Sig=.162). This indicates that the homogeneity of variance was equal. Therefore, a nonparametric test - the Mann-Whitney test, was run to see whether or not this difference between the mean scores is statistically significant. The following table 5.30 displays the results.

Table 5.30: The Mann-Whitney test results for the difference of the post WSS frequency use by the groups

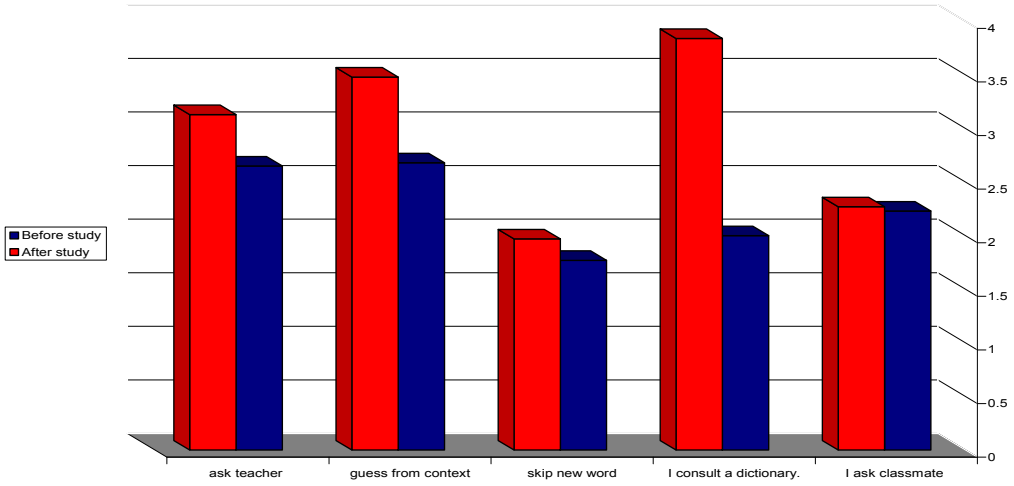
	Post WSS use
Mann-Whitney U	403.500
Wilcoxon W	1.070E3
Z	-1.970-
Asymp. Sig. (2-tailed)	**.049**
a. Grouping Variable: CALL and Traditional	

The above table 5.30 shows that the difference between the total mean scores is significant at the .05 level, just. This result confirms that the CALL multimedia classroom has affected the students' use of word solving strategies.

5.8 Change in WSS use by the CALL group

The following chart 5.2 summarizes and shows the change in using word solving strategies in the CALL multimedia class:

Graph 5.2: CALL students' change in the frequencies of word solving strategies use

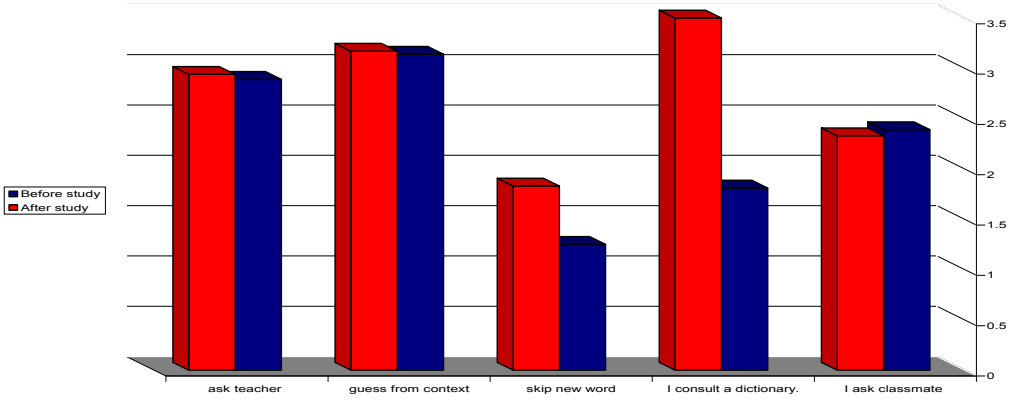


As shown above, the blue columns show the students' previous use of word solving strategies, while the red columns show the students' change in the use of these strategies after the study.

5.9 Change in WSS use by The Traditional group

The following graph 5.3 summarizes and shows the change in the use of word solving strategies in the traditional class before and after the study:

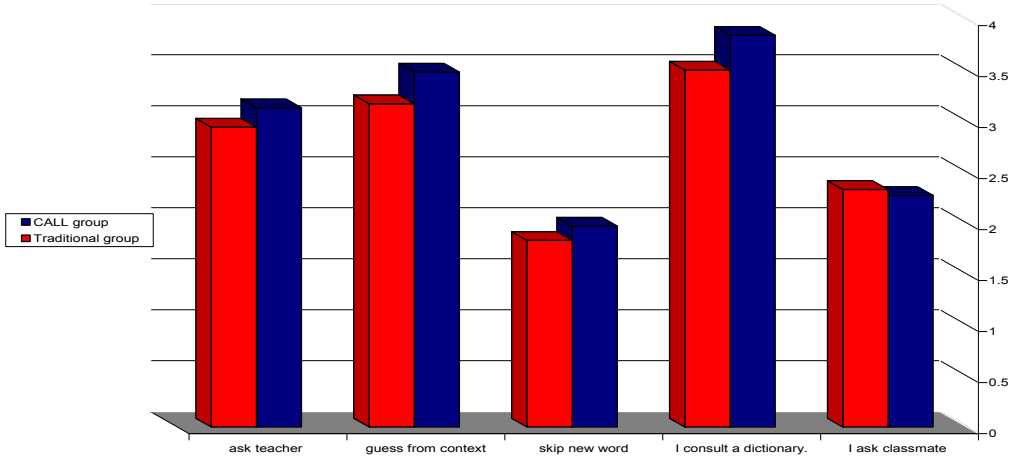
Graph 5.3: Traditional students' change in the frequencies of use of word solving strategies



5.10 The word-solving strategies use on the part of the two groups after the study

The following graph 5.4 presents the differences between the two groups with regard to the frequency of use of word solving strategies after the study. The blue columns indicate the CALL group and red ones indicate the traditional group:

Graph 5.4: The two groups' reported frequencies of strategy use after the study



5.11 The total mean scores of the perceived helpfulness of word solving strategies.

Descriptive statistics were used to calculate the total score of the reported responses. The following table 5.31 shows the total mean scores of the helpfulness rates for the two groups:

Table 5.31: The total mean scores in terms of strategy helpfulness by the two groups

Type	Group	N	M	SD
Total means of helpfulness rates	CALL	31	**20.80**	2.18
	Traditional	36	**19.00**	3.48

As shown above, the total mean score of the CALL group is 20.8 (SD= 2.18), which is higher than the total mean score of the traditional group which was 19 (SD= 3.48).

To see whether or not the difference is statistically significant, the p value had to be calculated. Before calculating it, the normality of distribution of data and homogeneity of variance were also be tested.

The following table 5.32 shows the results.

Table 5.32: Normality and homogeneity tests of the helpfulness perceptions

Tests of Normality			**Test of Homogeneity of Variances**			
Statistic	df	Sig.	Levene Statistic	Df1	Df2	Sig.
.936	67	.002	8.458	1	65	.005

Following the normality and homogeneity tests results in the above table, a nonparametric test, namely the Mann-Whitney test, was also be used to calculate the p value as shown in the table 5.33 below:

Table 5.33: The Mann-Whitney test results for the difference between the groups in the helpfulness perceptions

	WSS perception
Mann-Whitney U	402.000
Wilcoxon W	1068.000
Z	-1.976-
Asymp. Sig. (2-tailed)	**.048**
a. Grouping Variable: CALL and Traditional	

From the table above, the z value is -1.976-, which is significant at the .050 level. This indicates that the CALL group made more use of the word solving strategies than the Traditional group.

5.12 The ranking order of the most and least frequently used vocabulary learning strategies for the groups

To determine what are the most and least frequently used strategies for the two groups, descending descriptive statistics were used based on the mean scores for all strategies. Table 5.34, below, shows the analysis of the results for the CALL group. The most frequently used strategy is the 'consult a dictionary strategy', which was always used (M=3.84), while the least frequently used strategy is the “skipping strategy”, which was only sometimes used (M=. 1.97).

Table 5.34: The ranking order of the strategies use by the CALL Group

Rank	Strategy	Mean	N
1	**Consult a dictionary strategy**	**3.84**	**31**
2	Guess from context strategy	3.48	31
3	Ask teacher strategy	3.13	31
4	Ask classmate strategy	2.45	31
5	**Skip new word strategy**	**1.97**	**31**

Table 5.35 displays the rank order of the most and least frequently used strategies for the Traditional group. The result of the rank ordering analysis indicates that the most frequently used strategy is dictionary use (M=3.5), and the least frequently used strategy is the “skipping strategy” (M=1.83).

Table 5.35: The rank order of the strategy use for the traditional Group

Rank	Strategy	Mean	N
1	**Consult dictionary strategy**	**3.50**	36
2	Guess from context strategy	3.17	36
3	Ask teacher strategy	2.94	36
4	Ask classmate strategy	2.33	36
5	**Skip new word strategy**	**1.83**	36

As shown in the above tables, there is no difference in their ranking of the most and least used strategies.

5.13 The ranking order of the most and least helpful vocabulary learning strategies for the two groups

The same procedure of rank order arrangement as the use of strategies was carried out with regard to the strategies' helpfulness perceptions for both groups. The CALL group rated consulting a dictionary strategy as the most helpful strategy, and asking classmate strategy as the least helpful strategy based on the mean scores presented in the table 5.36 below:

Table 5.36: The most and least helpful strategies used by the CALL group

Rank	Strategy helpfulness order	Mean	N
1	**Consult a dictionary strategy**	**4.94**	**31**
2	Ask teacher strategy	4.81	31
3	Guess from context strategy	4.42	31
4	Skip new word strategy	3.45	31
5	**Ask classmate strategy**	**3.23**	**31**

Table 5.37 shows the most and least helpful strategies from the point of view of the Traditional group. It is clear that the same strategy, consulting a dictionary, was rated as the most helpful strategy with regard to studying the meaning of new words. The discrepancy between the CALL and the Traditional group can be found in the least helpful strategy, as for the latter both “skipping new word” and “ask a classmate strategies” were considered the least helpful strategies.

Table 5.37: The most and least helpful strategies used by the Traditional group

Rank	Strategy helpfulness order	Mean	N
1	**Consult a dictionary strategy**	**4.78**	**36**
2	Ask teacher strategy	4.28	36
4	Guess from context strategy	3.89	36
5	**Ask classmate strategy**	**3.03**	**36**
7	**Skip new word strategy**	**3.03**	**36**

So, there is no discrepancy between the groups in terms of the least frequently used strategies. But, there is a discrepancy between the two groups in terms of the perceived least helpful strategies.

5.14 The correlations between the frequency of use of word solving strategies and their perceived helpfulness in the two learning classrooms

Table 5.38: The correlation results between frequency of use and helpfulness perception of the vocabulary learning strategies in the CALL class

CALL group		Frequency of use	Helpfulness perception
Frequency of use	Pearson Correlation	1	**.413****
	Sig. (2-tailed)		**.021**
	N	31	31
Helpfulness perception	Pearson Correlation	**.413****	1
	Sig. (2-tailed)	**.021**	
	N	31	31

**. Correlation is significant at the 0.05 level (2-tailed)

It is clear that the frequency of word solving strategies use, in the CALL classroom, correlates statistically with its helpfulness. The Pearson correlation value is .413 and this was statistically significant at the .050 level. Table 5.39 presents the correlation between the frequency of use of word solving strategies and their perceived helpfulness in the traditional classroom:

Table 5.39: The correlation result between frequency of use and their usefulness rate in the traditional class

Traditional Group		Frequency of use	Helpfulness perception
Frequency of use	Pearson Correlation	1	**.481****
	Sig. (2-tailed)		**.003**
	N	36	36
Helpfulness perception	Pearson Correlation	**.481****	1
	Sig. (2-tailed)	**.003**	
	N	36	36

**. Correlation is significant at the 0.01 level (2-tailed).

As shown above, the frequency of use of the word solving strategies significantly correlates with its perceived helpfulness. The Pearson Correlation value is .481 and this correlation is statistically significant at the 0.01 level.

5.15 Summary of this section

In the above section, the quantitative data analysis of the post-strategy questionnaire proved that the CALL group outperformed the Traditional group in using the word solving strategies. The total score in terms of the strategy use on the part of the CALL group was greater than that of the traditional group and the difference between them was statistically significant.

With regard to the helpfulness perceptions towards these strategies, the total score of the CALL group in terms of helpfulness perception was also greater than the traditional groups' score and this difference is statistically significant. However, the analysis showed that both groups reported the dictionary use strategy as being the most used strategy when it came to learning new words and their perception towards it was positive. With regard to the least used strategy, both groups reported that the skip new word strategy was the least used one.

Ask classmate strategy was perceived to be not a helpful strategy in the two learning classrooms. The traditional group also perceived the skip new word strategy as not being helpful.

Also, the analysis results of the first part of the second questionnaire showed that the correlation test indicated that there were positive and significant correlations between the frequencies of word solving strategies use and its perceived helpfulness in both learning classrooms.

5.16 Questionnaire 2 part 2: The CALL learners' attitudes towards CALL

The purpose of this part of the questionnaire was to gather more details about the learners' experiences, attitudes and thoughts regarding their experience in studying vocabulary in the CALL multimedia classroom. The students' responses were computed and analyzed as shown in the tables and pie charts below that present the mean and percentage of learners' responses to each option of each question.

Q1- Have you ever used the internet and/or educational computer programs for learning English?

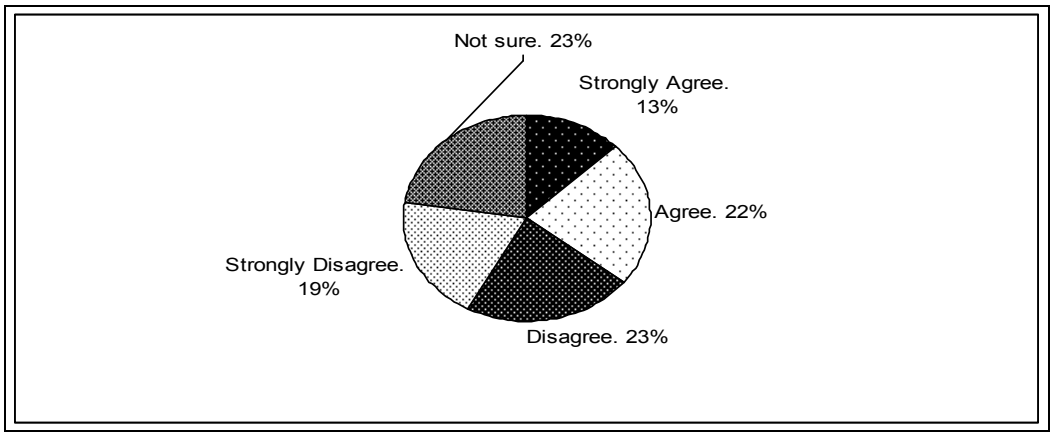
Table 5.40: Overall mean of the first attitude question

	N	M	St. D
Have you ever used the internet and/or educational computer programs for learning English?	31	2.84	1.36

The overall mean score of the previous experience related question about the use of internet and computer for learning English indicated that most of students have no previous experience of using computers and internet for studying English. The mean score of (2.84, SD=1.36) refers to a negative answer. This means that they have no previous use of computers for learning English.

The following pie chart 1 shows the percentage of responses, by the CALL group, for each answer.

Pie chart 1: The percentage of students' answers to the first question



It is clear that 35% (13% strongly agree, 22% agree), have used computers or the internet for learning English prior to this study. However, 42% of the participants reported that they did not use the internet or computers for learning English, in particular. In addition, 23% preferred not to reply to this question.

Q2- Have you ever felt bored during lessons in the language lab?

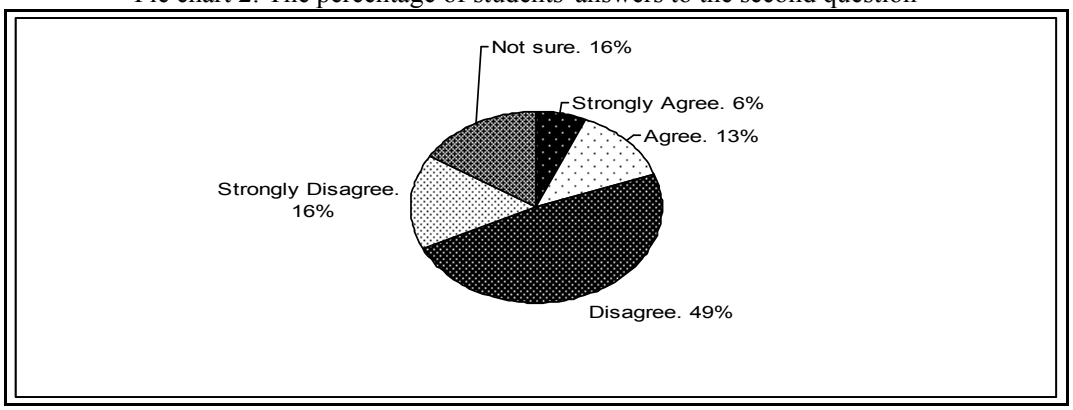
Table 5.41: Overall mean of the second attitude question

Have you felt bored during lessons at the lab?	**N**	**M**	**St. D**
	31	2.77	1.08

With regard to the second question, they reported that they did not feel bored in the laboratory when they were studying vocabulary. The overall mean score indicates that their feelings during the lessons were positive. The mean of 2.77, (SD=1.08), reflects the answer no. The pie chart 2 below shows that 19% of the learners felt bored while learning in the laboratory (13% agree, 6% strongly agree), while 65% of the learners

reported that they had enjoyed the lessons in the lab (49% disagree, 16% strongly disagree). However, 16% of the students preferred not to reveal their feelings.

Pie chart 2: The percentage of students' answers to the second question



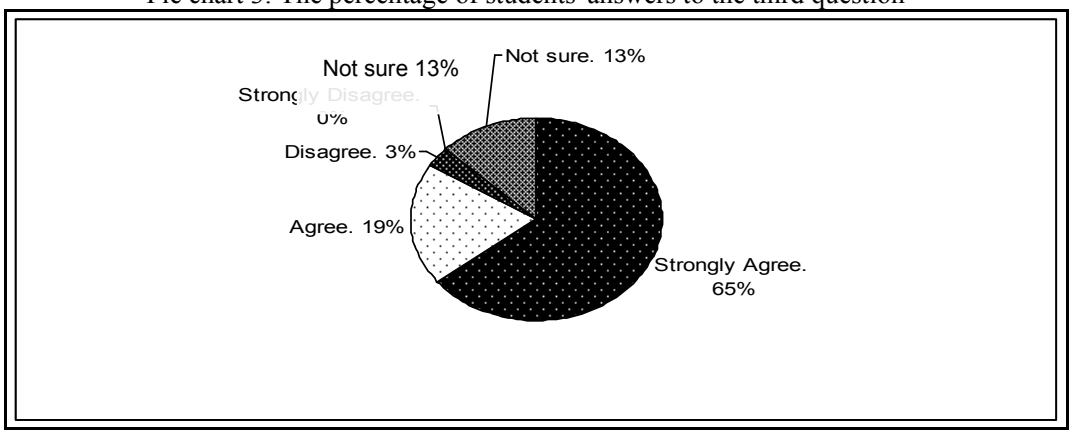
Q3- Do you support the use of computers in learning other subjects?

Table 5.42: Overall mean of the third attitude question

Do you support the use of computers in learning other subjects?	**N**	**M**	**St. D**
	31	4.23	1.35

An interesting positive attitude towards the use of computers in learning was obtained. The descriptive statistics showed that the overall mean of 4.23, (SD=1.35), indicate a positive answer (agree). This is shown in the pie chart 3 below. 84% of the learners supported learning through the use of computers (65% strongly agree, 19% agree). Only 3% of the participants strongly disagreed with the use of computers, while 13% did not mind either way. None chose ‘ strongly disagree’.

Pie chart 3: The percentage of students' answers to the third question



Q4- Did you make use of the vocabulary lessons as part of CALL?

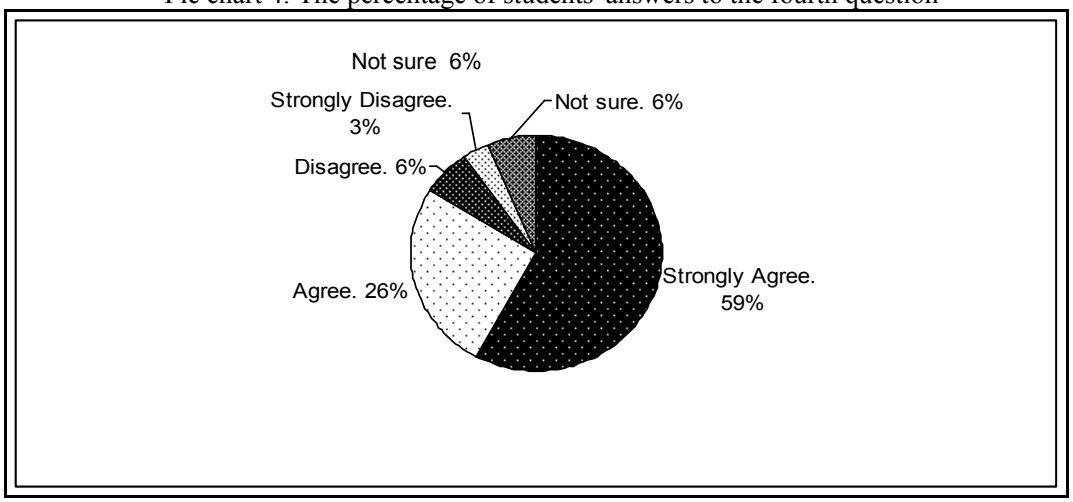
Descriptive statistical analysis, as shown in the table 5.43 below, presents the overall mean score of the respondents' answers for the fourth question. A 4.26 (SD=1.15) mean score indicates that the students agreed on finding CALL style vocabulary lessons beneficial.

Table 5.43: Overall mean of the fourth attitude question

Did you make use of the vocabulary lessons as part of CALL?	**N**	**M**	**St. D**
	31	4.26	1.15

Pie chart 4 below displays the percentage of responses to the fourth question. It is clear that the CALL students made use of learning vocabulary in the language laboratory, where computers and the internet were available. 85% of the students confirmed that lessons were useful and that they found them better than conventional methods of learning, while only 9% of the learners found them not useful. The qualitative analysis of the interviews was used to try and reveal why 9% of the students did not make use of CALL. However, 6% of the students preferred not to answer this question.

Pie chart 4: The percentage of students' answers to the fourth question



Q5- Were the explanations and examples clear?

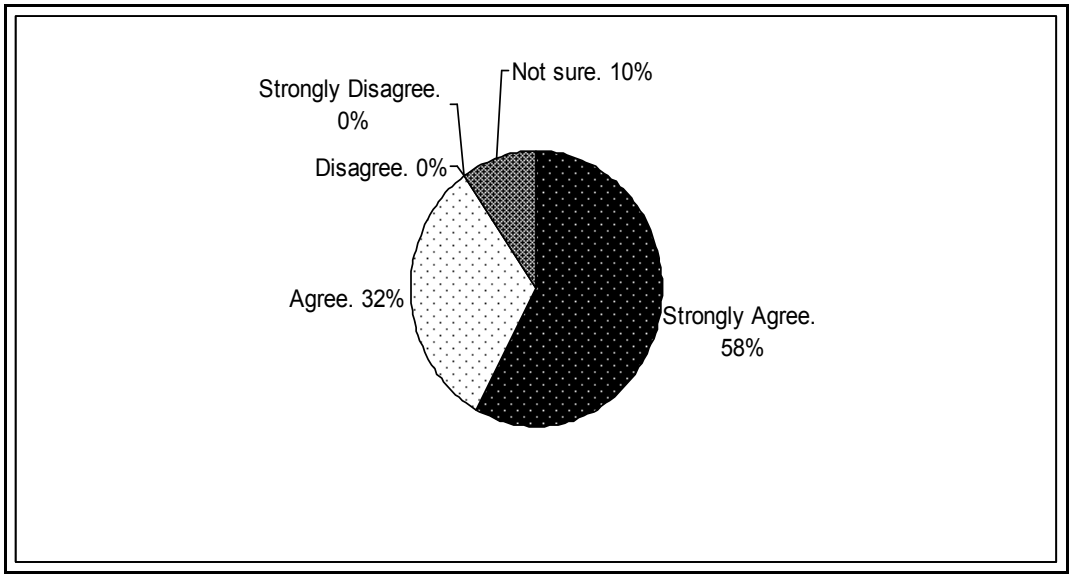
Table 5.44: Overall mean of the fifth attitude question

	N	M	St. D
Were the explanations and examples clear?	31	4.29	1.18

This question was asked to make sure that the teacher was able to explain the lessons clearly and that the contents were clear. The overall answer, (M=4.29. SD=1.18), showed that they were satisfied with clarity of examples and the explanations. The pie chart 5 below shows the percentages in terms of their answers.

90% of the students reported that the explanations were clear and that they were happy with them. 10% of them did not reply to this question, while none of the participants thought the explanations were not clear.

Pie chart 5: The percentage of students' answers to the fifth question



Q6- Do you think that learning vocabulary through the use of technology is better than the traditional way of learning?

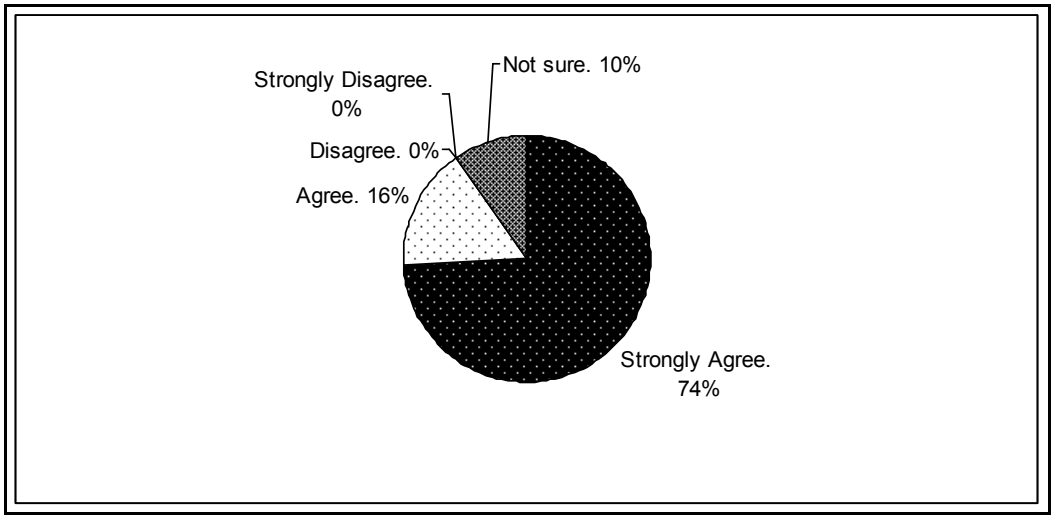
Table 5.45: Overall mean of the sixth attitude question

Do you think that learning vocabulary through the use of technology is better than the traditional way of learning?	**N**	**M**	**St. D**
	31	4.45	1.12

As can be seen in the table 5.45 above, the overall answer to the sixth question, (M=4.45, St. D=1.12), indicates that the students support the use of technology for learning L2 vocabulary and felt it is better than a traditional method of learning.

The following pie chart 6 displays the percentage of each answer of the sixth question. 90% of the learners responded positively (74% strongly agree, 16% agree). None of the learners replied negatively, while 10% of them preferred not to reply. The following pie chart 6 presents the results:

Pie chart 6: The percentage of students' answers to the sixth question



Q7- Do you think that language labs are important in schools?

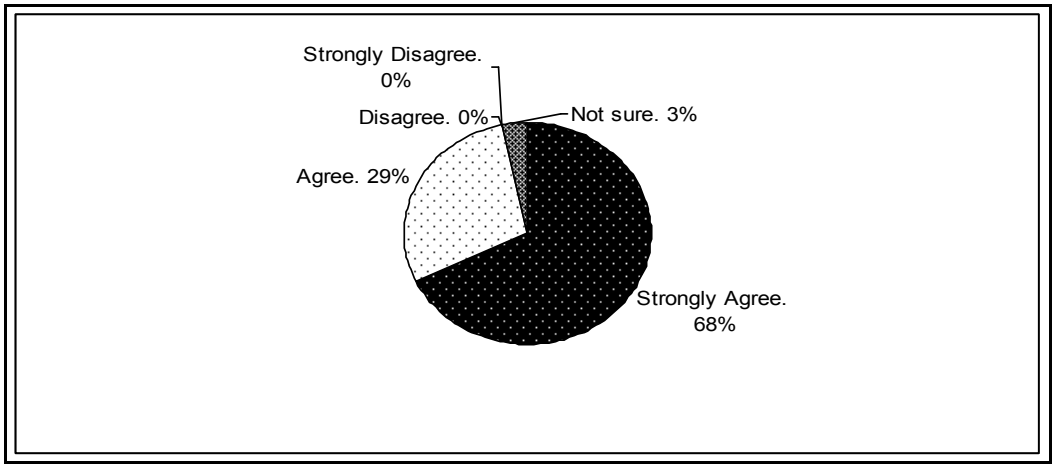
Table 5.46: Overall mean of the seventh attitude question

Do you think that language labs are important in schools?	N	M	St. D
	31	4.58	.807

The students' overall responses to this question, as shown in the table 5.46 above, indicates that they realize the importance of computers in schools. The mean score of 4.58 (SD= .807), means that the CALL participants strongly agree on the importance of the existence of language labs in schools.

The following pie chart 7 displays the percentage of selection, by the students, for each answer.

Pie chart 7: The percentage of students' answers to the seventh question



As shown in the pie chart above, 97% of the respondents confirmed their agreement on the importance of language laboratory in the school (68% strongly agree, 29% agree). 3% of the respondents did not respond to the question.

Q8 - Do you intend to search the Internet for websites for language learning or using computers for learning English in future?

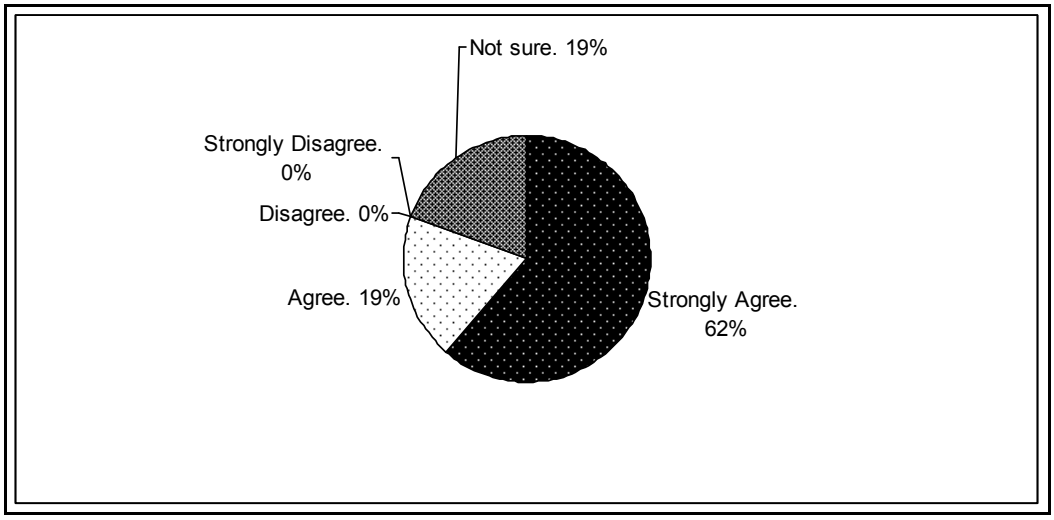
Table 5.47: Overall mean of the eighth attitude question

	N	M	St. D
Do you intend to search the Internet for websites for language learning or using computers for learning English in future?	31	4.03	1.56

With regard to this question, especially after the experience of learning vocabulary with CALL multimedia, it was appropriate to explore their intentions towards using CALL multimedia in future. The overall answer for this question is that they do intend to use CALL in future.

The mean score of 4.03,(SD= 1.56) indicates a positive response. The following pie chart 8 presents the percentage for each answer.

Pie chart 8: The percentage of students' answers to the eighth question



81% of the learners confirmed that they have the intention of using CALL for learning English in future (62% strongly disagree, 19% agree). 19% of the learners did not answer the question.

Q9- Was the Hot Potatoes activity useful?

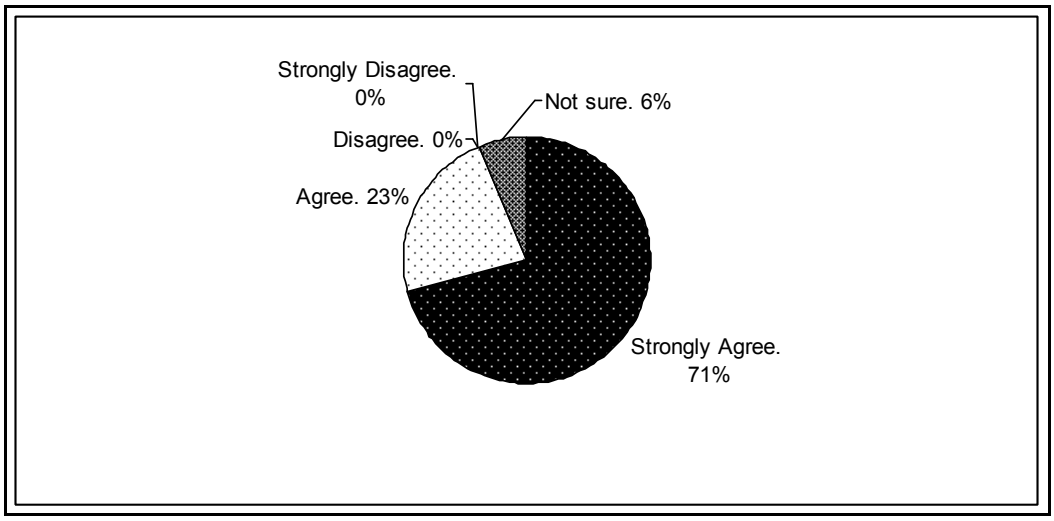
Table 5.48: Overall mean of the ninth attitude question

Was the Hot Potatoes activity useful?	**N**	**M**	**St. D**
	31	4.55	1.02

This question was asked to make sure that the participants, in the CALL multimedia classroom, made use of the Hot Potatoes activity. The students were able to get immediate feedback after filling out the blank spaces by selecting from a list of words. They were then able to obtain the percentage of correct answers, and had a chance to redo the activity in the event that their answers were wrong.

As can be seen in the table 5.48 above, the students strongly agreed on the usefulness of the Hot Potatoes activity. The mean score of 4.55, (SD=1.02), refers to the answer strongly agree. The pie chart 9 below presents the percentage of each answer:

Pie chart 9: The percentage of students' answers to the ninth question



94% of the respondents agreed that the activity designed by Hot Potatoes was vey useful (75% strongly agree, 19% agree). However, 6% of the respondents preferred not to reply.

Q10- Was the PowerPoint content useful?

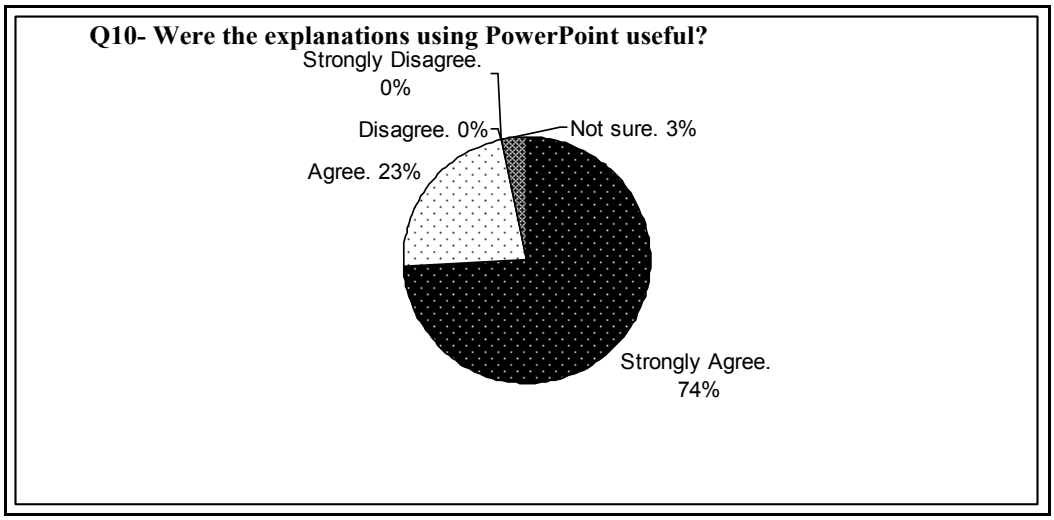
Table 5.49: Overall mean of the tenth attitude question

	N	M	SD
Was the PowerPoint content useful?	31	4.68	.633

This last question was asked as the theory of multimedia learning was applied by presenting each word with its definition and picture. It made sense to see how useful this type of presentation was for the CALL learners. The overall answer for this question is that the students considered this presentation as very useful. The mean

score of 4.68 (SD=.633) refers to the answer "strongly agree". The following pie chart 10 shows the percentage for each choice:

Pie chart 10: The percentage of students' answers to the tent question



It is clear that 97% of the students confirmed that it was beneficial (74% strongly agree, 23% agree). However, 3% of the students did not answer this question.

5.17 Summary of the quantitative attitudes analysis

The findings show that 35% of the CALL-class participants have not used computers or the internet for language learning purposes. Despite this, they enjoyed learning vocabulary in this way during the study. Therefore, a large number of them supported the existence of language labs and integrating computers in learning, particularly vocabulary learning. In fact, most of the participants reported that they made more use of vocabulary learning in the CALL classroom than in the traditional classroom. This is why 81% reported that they intend to use computers and the internet for learning English in future. Also, they reported that the PowerPoint explanations and Hot Potatoes activities were very useful.

5.18 The qualitative data analysis of the student interviews

In this section, the interviews with the participants will be analyzed qualitatively. Five participants of the CALL group took part in the interview process. The reason for these interviews was to support the quantitative data and to obtain more details about how they used the most frequently used strategy. Another reason for this interview is to ask the learners about their attitudes towards their experience in studying L2 vocabulary in the CALL multimedia classroom. The student responses to the five questions of the interview are analyzed in the following section.

Q1 - What is your impression of using computers for learning?

Four of the interviewees informed the researcher that they have gained a positive impression with regard to learning with CALL. Only one student reported that he had been left with a negative impression. Regarding the students who had a good impression, they all said that computers supported their learning in many ways. For instance, one student, (No.1), said that computers helped him learn reading, listening and writing more than traditional methods of learning which required human intervention such as teachers.

On the other hand, another student, (No.3), said that he found it difficult to use computers for learning. This was due to his lack of experience. He preferred using books and notes to using computers.

Q2 - What was the learning strategy that you most used to recognize the meaning of new word? Can you give examples?

The reason for asking the participants such a question was to obtain more detailed information on how they implemented the most frequently used word solving strategy in the CALL multimedia classroom to overcome new words. From their responses, it was clear that dictionary consultation was the most used strategy and this strategy was implemented in two ways.

The first way was consulting online dictionaries, exemplified by the use of Google translator and other free online dictionaries such as Babylon[3]. They can write or copy the new word or text into these websites and find their meaning easily. These websites have many features such as translating the word or text into many languages, providing pronunciations and offering synonyms and antonyms.

With regard to the second way, it was consulting offline dictionaries; the students used a Word Processor by copying the new word into it and translating it immediately. The availability of such programs was known even to people who were not highly experienced in computer usage such as student No.3.

Another interesting offline strategy was shown by the answer from student No.4, who reported that he used his mobile phone to get the meaning of the new words as he had installed translation software suitable for mobile phone devices.

[3] http://translation.babylon.com/

Q3- Have you ever felt bored when learning with computers? Why?

Most of the interviewees liked learning in this environment. As they stated that it has many features such as being able to learn freely and without being observed by the teacher or by someone else. Also, they can learn as much as they want without any time restrictions, and there are many opportunities for learning through the use of different websites. Only student No.3, who has little experience, felt bored because he needed to ask his classmates and the teacher many times about the use of programs.

Q4- Do you think that computers are important in schools?

The responses of the interviewees indicated that they all agreed on the importance of computers being available in school, as they can provide students with different sources of learning through which they can learn more effectively.

Q5- If you have used computers for learning, what programs have you used?

The participants, in the interview, mentioned many programs and websites that they have come across such as Google, the Babylon translation website and translation tools in Word Processors.

There is also the Wafi translation program, which translates words or text by copying and pasting it into it without accessing the internet. Participants also mentioned online English quizzes which are at different levels of English.

5.19 Summary of the qualitative analysis

The interviews confirmed that the CALL group generally had a positive attitude towards CALL. One student had a negative attitude and he explained this with his

lack of experience of using computer programs. However, most of the participants did not feel bored while learning vocabulary in the language lab.

Interestingly, the results showed that the interviewees have different ways of using some the most frequently used strategy, consult a dictionary. For example, some students used online e-dictionaries such as Google translator, while others used offline e-dictionaries such as Word Processor translator.

So, these interviews generally supported the attitudes found revealed in the part 2 of the second questionnaire.

5.20 Overall summary of results in relation to the study objectives

The study indicates that the CALL multimedia classroom has a positive effect in terms of vocabulary learning. However, the effect of size calculations showed that the CALL environment has a very large impact on the treatment group with regard to their achievements. Also, the findings indicate that the CALL multimedia environment encourages learners to use vocabulary learning strategies more frequently than was the case in the traditional classroom, and that these strategies were perceived as more helpful in the CALL classroom than in the traditional classroom. In addition, the findings show that the frequency of use of word solving strategies correlated significantly with their perceived helpfulness in the CALL multimedia classroom and in the traditional classroom. In addition, the findings indicate that the CALL participants have positive attitudes and beliefs with regard to using CALL multimedia for vocabulary learning. They agreed that CALL is helpful

for vocabulary learning and reported that the existence of computers in school is very important, though some of them were not very experienced in computer usage.

The following tables summarize the main results of comparisons between the two groups, in the current study, with regard to vocabulary achievements, and frequencies of and helpfulness perceptions towards word solving strategies use:

Table 5.50: Summary of achievements and VLS findings

Test	CALL group		Sig. value	Traditional group	
	SD	M		M	SD
Pretest	1.47	51.39	.108	50.97	1.20
Immediate test	4.39	79.32	**.000**	63.44	4.48
Delayed test	4.58	70.22	**.000**	61	3.24
Pre-use of VLS	3.10	11.32	.82	11.47	2.18
Post-use of VLS	1.82	14.87	**.049**	13.72	2.23
Helpfulness perception	2.18	20.8	**.048**	19	3.48

Table 5.51: The students' frequencies and helpfulness perceptions of VLS by the groups

Strategies	CALL group		Traditional group	
	Frequency	Perception	Frequency	Perception
Skipping	Low	Not helpful	Low	Not helpful
Guessing	Medium	Helpful	Medium	Helpful
Classmate help	Low	Not helpful	Low	Not helpful
Teacher help	Medium	Very helpful	Medium	Helpful
Dictionary consultation	High	Very helpful	High	Helpful

In the following table 5.52, the CALL students' attitudes towards their experience will be summarized.

Table 5.52: Summary of learners' overall answers for the attitude questionnaire questions

No.	Questions	Attitude
1	Have you ever used the internet and/or educational computer programs for learning English?	Negative
2	Have you felt bored during lessons at the lab?	Negative
3	Do you support the use of computers in learning other subjects?	Positive
4	Did you make use of the vocabulary lessons as part of CALL?	Positive
5	Were the explanations and examples clear?	Positive
6	Do you think that learning vocabulary through the use of technology is better than the traditional way of learning?	Positive
7	Do you think that language labs are important in schools?	Very Positive
8	Do you intend to search the Internet for websites for language learning or using computers for learning English in future?	Positive
9	Was the Hot Potatoes activity useful?	Very Positive
10	Was the explanation by the PowerPoint useful?	Very Positive

Chapter Six: Discussion

6.1 Introduction

In this chapter, the results of the current study, as presented in Chapter Five, will be discussed. Then, the findings will be compared with previous results from the literature so that the study's contribution can be identified. Furthermore, the research questions will be addressed throughout this discussion and the hypotheses of the study will be tested against the results in the final section of this chapter.

As stated in Chapter Four, there are seven research questions, which this study attempts to answer, and three null hypotheses identified for the investigation conducted. Therefore, the discussion chapter will be divided into three main sections in order to address the following research questions:

1- Are there statistically significant differences between the achievements of learners in the CALL multimedia classrooms and those in the traditional classrooms in the immediate and delayed post-tests?

2- What attitudes do learners in CALL multimedia classrooms have towards using CALL multimedia for vocabulary learning?

3- What are the most, and least, frequently used word solving strategies in CALL multimedia classrooms, when compared with traditional classrooms?

4- What are the most, and least, helpful word solving strategies in CALL multimedia classrooms, when compared with traditional classrooms?

5- Is there a statistically significant difference between the reported frequencies of word solving strategies used by learners in the CALL multimedia classrooms and learners in traditional classrooms?

6- Is there a statistically significant difference between the reported perceptions of the helpfulness of word solving strategies by the CALL multimedia and traditional learners?
7- Does frequency of use with regards to word solving strategies, significantly correlate with perceptions regarding its helpfulness in both CALL multimedia and traditional classrooms?

The first section will discuss the students' achievements in the vocabulary tests in the two learning classrooms. Moreover, this section will discuss the CALL students' attitudes with regard to using CALL multimedia for vocabulary learning. In this section, the first and second research questions will be answered. The data relevant to the first null hypothesis will be discussed in the final section, in terms of how this addresses the first research question.

The second section will deal with the differences and similarities between the two groups, with regard to the overall reported frequency of use of word solving strategies as well as their overall perceived helpfulness, as reported by the two groups, and the learners' helpfulness perceptions of each word solving strategy used. We will also discuss the correlations between the frequencies of use of word-solving strategies and their perceived helpfulness in each learning classroom. Therefore, this section is divided into separate subsections.

The first subsection discusses the frequencies of use of each of the word-solving strategies and the students' perceptions towards them in order to answer the third and fourth research questions. The second subsection is about the overall use of the word-

solving strategies to answer the fifth research question. The next subsection will discuss the overall helpfulness perceptions to answer the sixth research question. Then, there will be a subsection regarding the correlations between the frequencies and perceptions, so that we can answer the seventh research questions. Finally, the null hypotheses of this study will be tested against the results in a separate section.

6.2 Students' achievements and attitudes

6.2.1 Introduction

In this section, the results of the pretests as well as the immediate and delayed posttests will be discussed so that we can answer the related research question and also test the first null hypothesis that is related to the effect of the CALL multimedia classroom on the students' achievements, which will be discussed later in a separate section (6.7). In addition, the CALL learners' attitudes will be discussed in this section to answer the attitude-related question.

6.2.2 Students' achievements

The descriptive statistics showed that there were significant improvements in terms of the vocabulary knowledge on the part of the two groups after the implementation of this study. Both groups learned a significant number of the target vocabulary, but it is evident that the CALL multimedia classroom enhanced the participants' vocabulary acquisition when it came to learning the target vocabulary when compared with the traditional learning classroom.

As mentioned in Chapter 5, the total mean score of the immediate posttest of the CALL group, (M=79.323), was greater than the traditional group's mean score (M=63.44). The improvement of the CALL group in the size of the vocabulary knowledge indicates that the method of presenting vocabulary helped the learners, in the CALL classroom, acquire and remember the L2 target words, especially when it is supported with text, pictures and sounds. This interpretation is consistent with findings of many studies in the literature, which researched the effect of using multimedia on learning vocabulary (e.g. Yoshii and Flaitz, 2002; Yen and Wang, 2003; Yoshii, 2006; Akbulut, 2007; Kost et al., 1999, Luac, et al., 2006). They found that presenting vocabulary with text, pictures and sound or video is more effective than presenting vocabulary with text only.

However, this interpretation does not mean that the methods of vocabulary presentation, in the traditional classroom, are ineffective, as the traditional group has also learned a significant number of the target words. This is clear in the paired sample t-test results (see tables 5.6 and 5.8). The differences between the pretests and the posttests were statistically significant at the 0.01 level in both learning classrooms.

Therefore, this finding suggests that the method of teaching and presenting vocabulary is an important factor that may affect the students' learning of the new words. This interpretation is consistent with Al-Kloby's (2001) argument that vocabulary presentation is a factor that may lead learners to leave the class without acquiring the target words adequately. Their responses to the PowerPoint attitude-related question, in the questionnaire part (2), also confirmed that they made use of the PowerPoint presentations that included texts with pictures, (see Appendix 8),

which was also supported by pronunciations that were provided from online sources, such as e-dictionaries.

The traditional method of presenting words was not as efficient, however, as the method used in the CALL multimedia classroom. In the former, the presentation was limited to the word pronunciation and the meaning provided by their teacher, without any other opportunities of learning through repetition, practise or self-learning. The lack of learning opportunities, which the CALL environment provides, makes learning and practising vocabulary limited. CALL provides students with various resources for learning, such as searching the Internet for e-dictionaries that provide them with instant translations, such as the bilingual Google translator[4], where they can obtain the equivalent meaning in Arabic with the English pronunciation.

The interviewees reported that they do not have these opportunities in the traditional classroom. Furthermore, they mentioned the feeling of privacy when they were learning or doing the activities, which made them comfortable and not feel that they were under observation, or which made them afraid of committing mistakes.

With regard to the effect of the CALL multimedia environment on long-term retention, the participants in the CALL multimedia classroom also achieved greater scores in the delayed posttest, (M= 70.22), than the learners did in the traditional classroom (M= 61). In other words, the combination of text, pictures and sound has a positive effect on long-term retention and has helped the participants to remember the meaning of the target words.

[4] #/http://translate.google.com

This result is consistent with that of Yoshii and Flaitz's (2002) finding. They found that the use of text and pictures outperformed the use of text only or pictures only in both immediate and delayed posttests. This finding is also consistent with that of Boster et al. (2002), who stated that multimedia presentations help increase motivation, retention, better learning and improvement in student grades. Moreover, it is supported by Muashak et al.'s (2001) argument, which mentioned that educational software has a positive effect on learners' motivation by providing them with highly interactive technologies that make students engage with vivid colours and realistic sound.

In addition, the statistical analysis, see tables 5.10 and 5.12, apparently proved that the differences between the two groups in their achievements of the immediate and delayed posttests were statistically significant, as the p-value was .000. This result agrees with many studies that found the difference between CALL groups' achievements and the traditional group's to be statistically significant (e.g. Aljarf, 2007; Almekhalfi, 2006; Shafeeq, 2011). However, the finding is not consistent with Kayaoglu et al.'s (2011) finding, which found that the difference between the achievement of the CALL group and the traditional group was not statistically significant. This suggests that the design of the CALL teaching environment is of importance.

The effect size assessments of the students' achievements, in the immediate and delayed posttest, showed that the intervention, CALL multimedia, has a large positive impact on the treatment group (CALL group). The effect size value of the immediate posttest was 3.53, which is considered to be extremely large.

The effect size based on the delayed posttest was 2.33, which is also considered to be very large. These results are, however, consistent with many studies done on vocabulary learning in a traditional learning environment and in a CALL environment (see tables 2.6 and 2.7). Vocabulary studies do tend to have larger effect sizes that other studies (Hattie, 2009), with Stahl and Fairbanks (1986) reporting the majority of studies with effects of greater than 1.0 (mean effect size 0.97 (SD = .81, N = 41), with individual effect sizes ranging from 0 to 3.07. The immediate impact in this study is therefore at the higher end of this distribution.

Based on the above discussion, the answer of the first research question is clear that there are statistically significant differences at the .050 level between the two groups, with regard to their achievements in the immediate and delayed posttests.

6.2.2 Students' attitudes towards CALL

The second part of the questionnaire (2) showed that the participants, in the CALL multimedia classroom, have positive attitudes towards using CALL multimedia for learning vocabulary though some of them were not well experienced in computer usage for English learning; 42% of the participants were not well experienced in using computers for English learning and 23% of them preferred not to inform us. This result indicates that some participants may not have been experienced in how to deal with computer applications. This interpretation is supported by the response of one of the interviewees who reported, as he was not well experienced in using computer programs and found the lessons challenging. However, 35% of the participants reported that they have used the Internet and computer programs for learning English.

However, they reported enjoying learning in the CALL classroom. This is clear in their responses to the second question of the CALL-related-attitude questionnaire, when 65% of participants did not feel bored in the CALL class. In contrast, 19% of the participants felt bored. This result is supported by the interviewees' responses, in that most of them reported that they liked learning with CALL, as it provided them with several learning opportunities.

However, the interviewee who felt less motivated reported that this was because he had little experience of computer usage. This might be the same thing for the remaining 19% of the participants who felt less motivated. It could also be from other reasons. Despite this, the interviewees generally supported the use of technology in schools, and this response is supported with their responses to this question in the questionnaire, where 84% of the participants believed that the use of computers in school is very important.

With regard to their attitudes towards CALL for vocabulary learning, the CALL learners showed that they made use of learning vocabulary through the use of PowerPoint presentations, e-dictionaries and computer activities. They confirmed that the PowerPoint slides, which included text with pictures, were very useful and confirmed that computer activities, designed by Hot Potatoes, were useful, too. Therefore, 90% of the participants showed that learning vocabulary in the CALL classroom is better than in the traditional classroom. Moreover, this is supported by their intentions to use CALL in future learning, as 81% of them assured that they will use computers and the Internet for learning English in the future.

The participants' positive attitudes result is consistent with many studies (e.g. Alresheedi, 2008; Hsu and Sheu, 2008; Almekhalfi, 2006; Aljarf, 2007: Arishi, 2012) that explored the attitudes of learners towards CALL. They found that learners have positive attitudes towards CALL.

Based on the above discussion, the answer to the second research question - What are the attitudes of learners towards using CALL for vocabulary learning? - is that the CALL learners showed positive attitudes towards using CALL for vocabulary learning.

6.2.3 Summary of this section

This section discussed the students' achievements in the posttests in the two learning classrooms, as well as comparing them to their achievements in the pretests to measure any improvement. Also, the findings of the study showed that the CALL multimedia environment was effective and played an important role in terms of L2 vocabulary learning.

There was a significant improvement with regard to vocabulary achievements in both learning environments, and the extent of vocabulary improvement of the CALL group was greater than that of the traditional group. This appears to be because of the design of the the CALL multimedia classroom which offered learners various methods and sources for learning vocabulary, such as e-dictionaries and websites, and the presentation of the target words was supported by text, pictures and sounds. Furthermore, the results showed that CALL multimedia has positive effects on the

long-term retention of vocabulary, as it helped the students remember the words to be learned more effectively than it did the students in the traditional environment.

In addition, the findings showed that the CALL group had positive attitudes towards using CALL multimedia for vocabulary learning. Effect size calculations showed that the teaching approach using CALL multimedia had a large impact on the students' achievements in both the immediate and delayed posttests.

6.3 Word-solving strategies: frequencies, perceptions and correlations

6.3.1 Introduction

This section will discuss the reported frequencies of use of word-solving strategies and its perceived helpfulness on the part of the two groups. It will also discuss the correlation between the reported frequency of use of word-solving strategies and their perceived helpfulness in order to answer the related research questions.

It is worth mentioning that previous studies which have investigated the frequencies and helpfulness perceptions of vocabulary learning strategies, particularly frequencies of word-solving strategies, which will be compared to the findings, were conducted in traditional environments and there is none, to the best of the researcher's knowledge and confirmed by Scholfield (2011, personal contact) particularly in Saudi Arabia, which have been conducted in a CALL multimedia environment. This is why the findings, with regard to the CALL group, will be only compared to the findings of the traditional group, while the findings of the traditional group will be compared to previous relevant studies' findings.

6.3.1 Discussion findings for each word-solving strategy

6.3.1.1 Skipping strategy

It is clear from the results that the participants, in both CALL and traditional classrooms, were disinclined to use this strategy. The means of CALL (M=1.97) and traditional (M=1.83) groups indicate that the participants were low strategy users, according to Oxford's (1990) categorisation.

This disinclination could be because participants found that it was very important to understand as much as they could of the text in order to choose the right word from the dropdown list. Furthermore, the nature of the task requires the student to read and understand the words and sentences before and after the gap to fill it. To do this, they have to try other strategies, such as guessing or seeking help. This interpretation agrees with Scholfeld (2003) and Hosenfeld's (1977) arguments. They argued that the use of this strategy means that the learner does not really attempt to learn the unknown words.

However, as long as the participants have reported that they have used it, regardless of it being more or less frequently, this can be interpreted that the study participants found it useful to skip few of the unknown words in the passage, especially words that have no relation to the sentences with gaps or that do not help in filling the gaps. This interpretation is consistent with Alsweed (1996) and Yu-Ling's (2005) statement, which have mentioned that the skipping strategy is only beneficial with low frequency or unimportant words.

Both groups reported that this strategy was the least used strategy. This finding is consistent with the findings of many studies (Alsweed, 1996: Alqahtani, 2001; Hosenfeld, 1977; Alsweed, 2005). They all found that this strategy was the least frequently used strategy among the other word-solving strategies. This finding suggests that there is no discrepancy between the two groups with regard to using the skipping strategy when meeting an unknown word. This indicates that both groups were enthusiastic for learning.

Regarding the overall perception towards the helpfulness of this strategy, both groups perceived that skipping the unknown words is not helpful for vocabulary learning. The means of the CALL, (M=3.45), and traditional, (M=3.03), groups refer to the *not being helpful* choice in the questionnaire. This negative perception suggests that the participants were willing to learn the meaning of the unknown words they met, which actually is a positive indication, as they sought help from other helpful strategies, such as consulting a dictionary or guessing.

6.3.1.2 Seek help from someone strategy (teacher and classmate)

With regard to seeking help from someone strategy, particularly from a teacher or a classmate in the classroom, it is obvious that the participants, in both learning classrooms, were inclined to seek help from their teachers and disinclined to seek help from a classmate about the meaning of an unknown word. This is clear in the means of frequency use of these two learning strategies, which will be discussed below in some detail.

The participants, in both learning classrooms, are categorised as medium users of the ask teacher strategy, according to Oxford's (1990) categorisation. The means of CALL (M=3.13) and traditional (M=2.94) groups are between 3.49 and 2.5, which indicates a medium rank of strategy use. The reported responses to the frequency of use of this strategy, by the two groups, indicated that this strategy is regarded as the third used strategy among other strategies. Therefore, there is no discrepancy between the two groups in terms of using this strategy. This finding is consistent with Alsweed's (1996) and (2005) findings, when his participants, similar to ours, reported that this strategy was the third option for his participants for overcoming the unknown words.

Interestingly, the participants, in both learning classrooms, reported positive perceptions towards seeking help from their teachers to identify the meaning of the unknown word. The CALL group perceived this strategy as being a very helpful strategy (M=4.81), while the traditional group perceived it as being a helpful strategy (M=4.28).

Thus, there is also no discrepancy between the two groups' perceptions towards seeking help from their teachers, though the CALL group's perception was greater than the traditional group's. This result agrees with Schmitt's (1997) participants' perceptions, who perceived this strategy as being a useful strategy.

Contrary to the ask teacher strategy, the participants reported that seeking help from a classmate is not helpful for recognising the meaning of the new word. The reported means of the CALL (M=3.23) and traditional (M=3.03) groups refer to the choice of

'not being helpful' in the questionnaire. Therefore, this negative perception reduced the frequency of use of this strategy, as this is very clear in the reported means of the frequency question. The means of the CALL (M=2.45) and traditional (M=2.33) groups are below 2.5, which indicates a low rank of strategy use, according to Oxford's (1990) categorisation.

This result can be interpreted that the participants were disinclined to seek help from their classmates, as they are all low proficiency in English and that seeking help from other strategies is more useful. It is clear that all participants have tried to get the meaning of an unknown word from classmates, but some of their classmates did not know the meaning. Another interpretation is that they may have wanted to seek help from reliable sources, such as a dictionary or a teacher, or that they were able to guess the meaning from clues available. Al-Qahtani (2005) stated that EFL Saudi learners rely heavily on asking their tutors about unknown L2 words' L1 meaning, synonyms, spelling etc than depending on their classmates.

6.3.1.3 Guessing strategy

This strategy, as seen in the table 5.22, has ranked the second used strategy for both groups. The means of the CALL (M=3.48) and traditional (M=3.17) groups indicate that they are classified as medium users of this strategy, according to Oxford's (1990) categorisation.

Despite this, it is clear that the CALL group used it more. The increase in use of the guessing strategy might be due to the availability of the clues that appear when a student clicks for help, in addition to other clues. This is supported by their

perceptions of this strategy, as the participants perceived it as being a helpful strategy in both learning classrooms.

Thus, regarding this strategy being a helpful strategy indicates that being aware of how to use this strategy and having a background about the subject being taught helped the participants to use this strategy properly and then perceived it as a helpful strategy. This interpretation agrees with Alsweed (1996) and Carrel's (1985) arguments. They argue that a learner will be able to guess the meanings of the unknown words if he/she has a background on the subject. Clarke and Nation (1980) suggested that a learner's second choice of strategy should be this strategy, as guessing might not be correct at all times.

This study's findings are consistent with Alsweed's (2005) findings, who found that his participants, similar to those in this study, regarded the guessing strategy as the second most used one. However, the results are inconsistent with Al-Qahtani (2001) and Alsweed's (1996) findings. They found this strategy overall to be the most used strategy. This is likely to be due to the differences between the participants' level of English in the two studies.

With regard to the participants' perceptions towards the guessing strategy, the results showed that there was no discrepancy between the two groups towards helpfulness perceptions.

6.3.1.4 Consult dictionary strategy

As can be seen in the table 5.20, the participants, in both learning classrooms, are high users of the consulting dictionary strategy. The means of the CALL (M=3.84) and traditional (M=3.5) groups occur in the high rank categorisation of strategy use in Oxford's (1990) categorisation. In addition, using a dictionary was regarded the most frequently used strategy, by the two groups, to work out the meaning of the unknown word. This inclination to a dictionary suggests that the participants wanted to refer to reliable sources when they encountered an unknown word. Another interpretation is that they tried to confirm their guessing by checking the meaning of the unknown word in the dictionary.

The study's findings are consistent with Alsweed's (2005) findings, who showed that his participants reported that consulting a dictionary as the first choice to identify the meaning of the unknown word.

On the other hand, the findings are inconsistent with Alsweed (1996) and Alqahtani's (2001) findings, which showed that the guessing strategy was the most used strategy by their participants. This inconsistency is expected, as their participants were more proficient than ours. The proficiency level, as mentioned previously, is a factor that affects the choice of vocabulary learning strategies.

With regard to how this strategy was used by the participants, especially in the CALL classroom, the interviewees showed that there were two ways of using this strategy: first, looking the meaning of the new word up in an online dictionary, such Google

translator[5]; second, looking the unknown words up through using offline programs, such as Microsoft Word. However, in the traditional classroom, students could only use a paper dictionary.

So, the increase in the mean of the CALL group's reported use of dictionary (3.84) might be because they were encouraged or supported more than the traditional group (3.5), as it was easier for them to use an online or e-dictionary, by copying or writing unknown words, than searching a word in a paper dictionary, which was not as easy to use.

After the above discussion of the word-solving strategies' frequencies and perceptions, the answers for the third and fourth research questions are clear. With regard to the third research question, the result is shown in the following table 6.1:

Table 6.1: Answer of the third research question

Type	CALL group	Traditional group
Most frequently used strategy	Dictionary consultation	Dictionary consultation
Least frequently used strategy	Skipping strategy	Skipping strategy

Coming to the fourth research question, which is about the most and least helpful strategies as perceived by the participants, the following table 6.2 shows the answer.

[5] #/http://translate.google.com

Table 6.2: Answer to the fourth research question

Type	CALL group	Traditional group
Most helpful strategy	Dictionary consultation	Dictionary consultation
Least helpful strategy	Ask classmate	Ask classmate
		Skipping

6.4 Overall frequencies of word-solving strategies use and their perceived helpfulness

6.4.1 The word-solving strategies overall use

The aim of this section is to answer the fifth research question. The overall means of the reported frequencies of the word-solving strategies use, by the two groups, indicate that both groups have used the word-solving strategies better than before the implementation of the study. This improvement could be referring to the instructional presentation of the word-solving strategies that the participants have been introduced to before implementing the current study, which aimed at making the participants aware of the word-solving strategies and how to make the most of them.

The CALL group's mean was 11.32, while after the study it was increased to 14.87, and the paired sample t-test showed that the difference was significant. The traditional group's mean was 11.47 and was 13.72 after the study and the difference was statistically significant, too.

These changes in reported use of the word solving strategies confirm the importance of training students on the proper use of vocabulary learning strategies. The findings

agree with the findings of Tassana-ngam (2005), who investigated training students on using the vocabulary learning strategies. The results of his study showed that his participants' use of vocabulary learning strategies improved after training. Alsweed (2000) argued that learners should be trained in the proper use of learning strategies, particularly regarding dictionary consultation.

Interestingly, it is clear that the CALL group reported using word-solving strategies more effectively than the traditional group and the difference between the two groups was statistically significant at the .050 level. This result is an indication of the role that CALL played to motivate students on using word-solving strategies during the class. This interpretation agrees with Oxford's (1994) argument, which stated that motivated learners tend to use more strategies than less-motivated ones.

Moreover, this interpretation is also supported by Lewis' (2004), Reiners et al. (2005) and Page's (2002) arguments. They argued that mobile or fixed computers help and motivate learners to learn, and also increase interaction in the classroom. The interviewees' views support this interpretation, especially when they stated that the use of CALL encouraged them to learn and provided them with sources for learning which, in turn, provided them with opportunities to use more strategies.

The non-parametric test showed that the difference between the two scores of the two groups was statistically significant, as the p-value was .049. Based on this result, the answer to the fifth research question is that the difference between the reported frequencies of use of the two groups is statistically significant at the .050 level.

6.4.2 The overall perceptions towards the word-solving strategies helpfulness

The purpose of this section is to answer the sixth research question mentioned above. The overall mean of the learners' responses to the helpfulness perception question for each strategy shows that the participants, in the CALL classroom, made use of the word-solving strategies more than the students in the traditional classroom. The mean of the CALL group is 20.8 (SD=2.18), and is greater than the traditional group's mean of 19 (SD= 3.48).

This result confirms that the CALL group reported using the word-solving strategies more than the traditional group because they made more use of these strategies, which can be referred to what CALL provided the participants with. This interpretation agrees with Bulut and Abuseileek's (2007) arguement. They stated that learner's positive attitude towards CALL motivates him/her to make use of the learning strategies.

However, the difference between the two groups is statistically significant, as the p-value was .048. This answers the sixth research question.

6.5 Correlations between frequencies of VLS and its helpfulness

Coming to the correlation between the reported frequencies and helpfulness perceptions, the findings, shown in the tables 5.38 and 5.39, showed that there was a positive and significant correlation between the reported frequencies of word-solving strategies and their perceived helpfulness by both CALL and traditional groups. This result suggests that whenever a learner finds a strategy helpful, he/she will use it more. This finding is consistent with Lip's (2009) finding. He found that there was a

significant correlation between frequencies of vocabulary learning strategies use and their perceptions of usefulness.

This result answers the seventh research question, which was about the correlations between the reported frequencies of use of word-solving strategies and their perceived helpfulness.

6.6 Summary of this section

The previous section showed that the CALL group outperformed the traditional group, with regard to their reporting of frequently using and exploiting word-solving strategies. In other words, the CALL multimedia environment appear to be either more motivated or more supported as learners in this more frequent use and greater exploitation of word-solving learning strategies than the students in the traditional environment.

Also, the findings showed that there are no differences between the two groups at the extremes, with regard to the reported most and least used strategies. The dictionary consultation strategy was reported as the most used one, though it was reported most of all in the CALL traditional classroom. Furthermore, both groups perceived this strategy as being helpful.

The skipping strategy was the least used strategy in both CALL and traditional classrooms as well as the least helpful strategy for the two groups. In addition, the ask classmate strategy was perceived as not being helpful by the traditional group, either.

In addition, analysis showed that the frequencies of word-solving strategy use was correlated with the helpfulness perceptions significantly in both the CALL and traditional classrooms.

Thus, in this section, the third, fourth, fifth, sixth and seventh research questions have been answered throughout the discussion.

6.7 Testing the null hypotheses of the study

In this section, the hypotheses of the study will be tested according to the findings of the study. The following table 6.3 shows the hypotheses of this study and the test results:

Table 6.3 : The hypotheses testing results

No	Hypothesis	Test result
1	There is no significant difference (at the .050 level) between the achievements of learners in CALL multimedia classrooms and the achievements of learners in traditional classrooms, with regards to learning L2 vocabulary.	**Rejected**
2	There is no significant difference (at the .050 level) between learners in the CALL multimedia and traditional classrooms with regards to the overall reported frequencies, regarding the use of word-solving strategies.	**Rejected**
3	There is no significant difference (at the .050 level) between the overall perceptions regarding the helpfulness of word-solving strategies in the CALL multimedia and traditional classrooms.	**Rejected**

With regard to the first hypothesis, which supposes that there are significant differences at the level of .050 between the achievements of the learners in the CALL multimedia classroom and the achievements of the learners in the traditional classroom, the findings of this study indicated that this was not the case as the differences between the achievements of the two groups are statistically significant at the 0.01 level. Therefore, the null hypothesis is rejected and we must accept the alternative hypothesis, which supposes that there are significant differences between the achievements of the learners of the two groups at the .050 level.

Regarding the second null hypothesis, which supposes that there is no significant difference at the .050 level between the two groups with regard to the reported frequencies of word-solving strategies use, the statistical findings showed that the difference between the two groups is statistically significant at the .050 level. Therefore, this null hypothesis is rejected and we accept the alternative one.

Coming to the last null hypothesis of this study, which supposes that there is no significant difference at the .050 level between the two groups' perceptions towards the word-solving strategies helpfulness, the result show that the difference between them is statistically significant at .050 level, which leads us to reject this null hypothesis and accept the alternative hypothesis that supposes that there is a significant difference at the .050 level between the two groups with regard to their reported helpfulness perceptions towards the used strategies.

6.8 Overall summary of this chapter

The current study aimed first to investigate the effect of using CALL multimedia on learners' achievements and second to examine to what extent CALL might encourage learners to use word-solving strategies, when compared with traditional methods of learning. Also, it aimed to explore the learners' perceptions towards the word solving strategies in two different learning classrooms as well as their attitudes towards learning vocabulary with CALL multimedia.

The findings of this study showed that the CALL multimedia classroom affected the learners' achievements in both the immediate and delayed posttests, when compared with the learners' achievements in the traditional classroom. The CALL group's achievement score was higher than the traditional groups, and the difference between them was statistically significant at the 0.01 level. This result answered the first research question. Also, the effect size calculations showed that the CALL multimedia has a large impact on the students' achievements in the immediate (ES=3.53) and delayed (ES=2.33) posttests.

In addition, the CALL learners showed positive attitudes towards studying L2 vocabulary in the CALL multimedia environment, both in the questionnaire and interviews. They supported the use of a language laboratory in schools. This result answered the second research question.

With regard to the second objective of the study, this study indicate that the teaching strategies used in the CALL multimedia classroom encouraged the CALL group to use (or at least report using) the word-solving strategies more frequently than did the

traditional group. The CALL group therefore appears to have made greater use of word-solving strategies than the traditional group, since there were educational resources available through the technology that were not available in the traditional classroom.

However, there were no differences between the two groups in the most and least frequently used strategies. Also, there was no difference between the groups, with regard to the most helpful strategies in the two learning classrooms. With regard to the least helpful strategy, both groups regarded the ask classmate strategy as the least helpful strategy, but for the traditional group, the skip new word strategy was also regarded as the least helpful strategy. These results answered the third and fourth research questions.

Despite both groups having a similar rank of order for the most and least frequently used strategies, the CALL group used the word-solving strategies better than the traditional group, and the difference between the scores of the two groups was statistically significant ($p=.049$). This result answered the fifth research question.

Regarding the overall perception of helpfulness towards these strategies, the overall scores showed that the CALL group saw the word-solving strategies as more helpful than the traditional group's. The difference between the two groups was statistically significant ($p=.048$). This result answered the sixth research question. The availability of the various sources, which CALL provides, might have therefore helped the CALL students to make more use of the word solving strategies, even though some of the learners were not very experienced in computer use.

The correlation results between the frequencies and perceptions of the word-solving strategies showed that there are associations between the use of word-solving strategies and their helpfulness perception in both learning classrooms. This indicates that there is consistency in the learners' perceptions and increases the likelihood that these perceptions are an accurate reflection of their actual use. These findings answered the seventh research question.

The findings of this current study therefore indicate that teaching approaches supported with CALL multimedia can be very effective for L2 vocabulary learning and can support students in using and developing their wider use of word-solving strategies. These are considered to be very important for any L2 learner to develop knowledge of new words, compared with the traditional methods of learning vocabulary.

Also, training the students on how to use word-solving strategies in an appropriate way can encourage learners to try to make greater use different strategies. This was evident in the difference between their previous use of these strategies before this study and what was reported after this study for both groups.

Chapter seven: Conclusion
7.1 Introduction
7.2 Summary of the major research findings
7.3 Agreement and disagreement of the study's findings with previous research
7.4 Summary of the hypotheses testing result
7.5 limitations of the study
7.6 Recommendations
7.7 Implications for further research
7.8 Contributions of this study
7.9 Summary of this chapter

Chapter seven: Conclusion

7.1 Introduction

The aim of this chapter is to provide a summary of the whole thesis and the main findings which arose from the answers to the research questions and the test results from the hypotheses. The contributions of this study to its field will also be indicated. In addition, the limitations of the study as well as recommendations and implications for future research will be provided.

7.2 Summary of the major research findings

In this section, the main findings of the current study will be summarised in accordance with the answers of the research questions.

7.2.1 Research question (RQ)1: Are there statistically significant differences between the achievements of learners in the CALL multimedia classrooms and those in the traditional classrooms in the immediate and delayed post-tests?

The analysis of the immediate and delayed post tests showed that the CALL group learned the target words better than the traditional group. The mean scores of the two groups are presented in the table below:

Table 7.1: Summary of the immediate and delayed post tests analysis

Group	Immediate post test			Delayed post test		
	M	SD	Sig.	M	SD	Sig.
CALL	79.32	4.39	.000	70.22	4.58	.000
Traditional	63.44	4.48		61	3.24	

Despite the fact that both groups were equivalent in the pre-tests and their level of vocabulary knowledge improved after the study, it was apparent that the CALL group outperformed the traditional group in both the immediate and delayed post test whilst the differences between these means were statistically significant. This was a strong indication that CALL multimedia has supported and motivated the students to learn and remember the target L2 words better than the traditional learning environment. Whilst it is still believed that the traditional method is effective, these methods were not as effective as the CALL multimedia method when it came to vocabulary learning as proved in this study.

The effect size calculations of the immediate and delayed post tests showed that CALL multimedia (the intervention) had a significant impact on the CALL group. The effect size in immediate post test was 3.53 and in the delayed post test it was 2.33 indicating a very large improvement which was sustained. However, large effect sizes were found in some studies that researched vocabulary in both traditional and CALL learning environments (see tables 2.6 and 2.7).

7.2.2 RQ 2: What attitudes do learners in CALL multimedia classrooms have towards using CALL multimedia for vocabulary learning?

With regard to this question, the participants of the present study generally showed that they had positive attitudes towards integrating CALL into the curriculum and stressed the importance of its existence in schools. The following points summarise the overall attitudes of the students towards CALL:

- Some of the CALL learners had no previous experience of using computers for language learning meaning that some of the participants preferred traditional materials to CALL materials.
- Most of the CALL group considered the use of computers in schools to be very important.
- Most of the CALL group felt more engaged while learning vocabulary in the CALL classroom and confirmed that they made use of CALL for vocabulary learning.
- Most of the CALL group felt that the use of CALL multimedia was more beneficial than the traditional methods for vocabulary learning and therefore they intended to use CALL in the future.
- They also confirmed that the specific tools used in this study (Hot Potatoes and PowerPoint slides) were very useful.

With this said, some students did not prefer to use CALL for vocabulary learning. They mentioned that this disinclination to use CALL was because they felt they were not experienced enough with regards to using computers. Michael et al. (2008) stated that lacking the required skills for using educational programs on computer may not help students to fully participate.

Cheurparkobkit et al. (2002) considered the lack of computer use skills as a barrier to learning. Stokes (2003) found that students who did not feel comfortable at using computer were less likely to be satisfied with their online learning.

7.2.3 RQ 3: What are the most, and least, frequently used word solving strategies in CALL multimedia classrooms, when compared with traditional classrooms?

The statistical analysis results of the second version of the questionnaire (part1) showed that both groups had similar sequential preferences when it came to using the word solving strategies. The dictionary consultation strategy was reported to be the most frequently used strategy among others (CALL= 3.84 and Traditional= 3.50). Both groups were categorised as high users of this strategy.

The skip new word strategy was reported as the least commonly used strategy (CALL= 1.97 and Traditional= 1.83), which indicated that they were low strategy users. Although both groups were classified as high dictionary users, the CALL group used dictionaries more than the traditional group. This might have been due to the availability and ease of using both online and offline dictionaries, as mentioned in the interview.

However, this result showed that there were no discrepancies between the two groups with regard to their preferences of the strategies used. The same result was found in previous research that explored word solving strategies (e.g. Alsweed, 1996, 2005, Hosenfeld, 1977). They found that low proficient learners considered dictionary use as their first choice to identify the meaning of unknown words.

7.2.4 RQ 4: What are the most, and least, helpful word solving strategies in CALL multimedia classrooms, when compared with traditional classrooms?

The analysis results showed that the dictionary use strategy was considered the most helpful strategy according to the two groups (CALL=4.94 and Traditional=4.78). This also meant that there was no difference between the two groups with regard their perceptions of dictionary use. However, the only discrepancy which can be noted is with the least helpful strategy. The CALL group regarded the seeking help from a classmate as not helpful (M=3.23). In contrast, the traditional group not only regarded the classmate (M=3.03) as not being helpful, but also perceived the skip new word as not being helpful (M=3.03). Also, this finding has been found in previous research that focused on word solving strategies (e.g. Alseweed, 1996, 2005; Hosenfeld, 1977). Skip unknown word strategy was the last choice for learners when meeting new word.

7.2.5 RQ 5: Is there a statistically significant difference between the reported frequencies of word solving strategies used by learners in the CALL multimedia classrooms and learners in traditional classrooms?

The overall means of the reported use of the word solving strategies suggest that both groups used these strategies in a more effective way when compared to their previous use of the strategies. The CALL group's mean of previous use of the strategies was 11.32, while after the study it increased to 14.87. The same was true for the traditional group with an initial figure of 11.47 increasing to 13.72 after the study. From this, it is likely that both groups used the word solving strategies more effectively than before, perhaps due to the benefits of the training session. This finding is similar to Tassana-ngam's (2005) finding when his participants use of vocabulary learning strategies

improved after training them in how to use strategies. Even more interesting is the fact that the CALL group surpassed the traditional group. Indeed, the mean score of the CALL group was higher than the traditional group. Statistically, the non-parametric test showed that the difference between the two scores was significant (p=.049), and in light of this the answer to the question at hand was apparent.

7.2.6 RQ 6: Is there a statistically significant difference between the reported perceptions of the helpfulness of word solving strategies by the CALL multimedia and traditional learners?

The CALL group's overall mean of helpfulness perception was 20.80, with a figure of 19 for the traditional group. Interestingly, the nonparametric test showed that the difference between the overall helpfulness perceptions of the two groups was statistically significant (p= .048).

7.2.7 RQ 7: Does frequency of use with regards to word solving strategies, significantly correlate with perceptions regarding its helpfulness in both CALL multimedia and traditional classrooms?

With regard to the last research question, the analysis showed that the frequencies of reported use of the word solving strategies correlated significantly with its perceived helpfulness perceptions in both learning environments. The Pearson Correlation value, in the CALL environment was .413 whilst the p-value was .021. In the traditional environment, the Correlation value was .481 with a .003 p value.

7.3 Summary of the hypotheses testing result

This study attempted to test three null hypotheses. In this section, each hypothesis will be briefly summarised in conjunction with its test result.

7.3.1 Result of the first null hypothesis test

This hypothesis was tested against the results obtained from the current study. This hypothesis assumed that there was no significant difference (at the .050 level), between the achievements of learners in CALL multimedia classrooms and the achievements of learners in traditional classrooms, with regards to learning L2 vocabulary.

The statistical analysis for the immediate and delayed post-tests showed that the differences between the two groups were statistically significant as the p value was .000. The first null hypothesis was therefore rejected and the alternative hypothesis accepted.

7.3.2 Result of the second null hypothesis test

This hypothesis related to the frequencies of the word solving strategies use. It assumed that there is no significant difference (at the .050 level) between learners in the CALL multimedia and traditional classrooms with regards to the overall reported frequencies regarding the use of word solving strategies.

The analysis shows that the CALL group outperformed the traditional group and the difference between the overall use of these strategies was statistically significant as the p value was .049 thus leading us to reject the second hypothesis and accept the alternative one.

7.3.2 Result of the third null hypothesis test

The third hypothesis also related to the word solving strategies, but was more concerned with students' helpfulness perceptions towards these strategies. The overall mean scores of the two groups showed that the CALL group made use of these strategies more than the traditional group and the difference between the two means was statistically significant as the p value was .048. In light of this, the third hypothesis was rejected and the alternative accepted.

7.4 Agreement and disagreement of the study's findings with previous studies

Table 7.2 summarises the findings of the current study that agreed with the findings of the previous research. Also, it shows the findings that disagreed with the current study's findings.

Table 7.2: The agreement and disagreement of the study's finding with previous research

Type	**Agreement**	**Disagreement**
Effect of CALL on learners' achievements	Almekhalfi (2006); Aljarf (2007); Shafeeq (2011)	Kayaogh et al. (2011)
Use of multimedia	Yoshi and Flaitz, (2002); Yen and Wang (2003); Yoshii (2006); Akbulut (2007); Kost et al., (1999); Lauc et al. (2006); Aljraiwi, (1999)	----------
Learners' attitudes towards CALL	Alresheedi (2008); Hsu and Sheu (2008), Almekhalfi (2006); Aljarf (2007); Shafeeq	----------

	(2011); Kayaogh et al., (2011), Lauc et al. (2006)	
Difference in using word solving strategies in two different learning environments	---------	----------
Rank order of the most and least frequently used word solving strategies	Hosenfield (1977), Alseweed (1996), (2000)	Alqahtani (2001)
Learners' perceptions towards word solving strategies helpfulness	--------	----------

7.5 Limitations of the study

As with any other study, the current study encountered certain limitations which must be acknowledged in order to avoid future studies experiencing the same issues. These limitations were as follows:

- As this study was a quasi-experimental study, the researcher found it hard to truly randomise the participants into two groups. The allocation was however limited by the Deanship of Admission and Registration at the beginning of the semester due to the fact that this study was conducted in the middle of the semester and the students had already been distributed into classrooms.
- This study used a small scale of participants - 67 students (N=31 as treatment group, N=36 as control group). Most of the participants were from the middle

of Saudi Arabia (Majmaah, Riyadh, Gassim, Hafer Albatin, Sudair and so on). This was because the university was in its first academic year after its establishment and as such had a shortage of students.

- Some of the participants were not adequately experienced with regards to using the computer software, particularly Hot Potatoes and using online dictionaries. With this in mind, the researcher explained how to use Hot Potatoes activity and how to find and use the online dictionaries through conducting a Google search and providing them with some suggested dictionaries.
- Although the oral interview was conducted with only five students from the CALL classroom, only one question focused on how they used the dictionary, whilst the analysis of results depended mainly on the quantitative data which were collected from the questionnaire with regards to the other strategies. In a strategy questionnaire, Cohen (1998) stated that it was possible that learners either underestimated or overestimated the frequency of use of some strategies they use.
- At the time of this study, there was no Deanship of Information Technology. In light of this, the researcher depended on himself to set the language laboratory, check the computers and download the Hot Potatoes to the main computer.
- This study was conducted in Saudi Arabia at Majmaah University. The 67 homogenous participants were in the first year of an English BA. With this in mind, the present study may not be to be generalised to other studies in terms of research methodology, participants' background, first language, gender and other factors involved with the research procedures.

- Due to time constraints, there was no time to interview any participants from the traditional classroom in order to gauge their attitudes towards using the word solving strategies after the training session as this study was not primarily focused on VSL teaching or training. Indeed, we were not certain as to whether or not their use of the strategies was improved because of the training in VLS, the encouragement for participating in this study, or both.
- Although the CALL group were asked in the interview about the most frequently used strategy 'dictionary consultation', we did not ask them about their use of the other strategies. This was because the main aim of the interview was to assess their attitudes towards CALL, but the researcher found that there was no discrepancy between the two groups' preferences in terms of the most frequently used strategies after statistical analysis. It would be better if the researcher had also asked them about their use of the other strategies and reasons behind their disinclination to use certain strategies.

7.6 Recommendations

The findings of the current study have led to a number of recommendations which should be taken into account by educators and decision makers in Saudi Arabia:

- CALL multimedia could usefully be integrated into the curriculum of subjects, especially English subjects in all schools in Saudi Arabia.
- Teachers and students should be encouraged to and educated in how to make the most of technology with a view to improving the methods of teaching and learning.

- Decision makers, especially in Majmaah University, should do their best to establish language laboratories in all colleges and apply e-learning effectively by supplying students with all necessary materials such as Internet, computers and so on. Members of staff should also be encouraged to integrate computers into the curriculum.
- It is strongly recommended that English teachers should train their students in how to use vocabulary learning strategies more effectively and explicitly. This can be done through examining their awareness of the vocabulary learning strategies at the beginning of every academic year and providing a tutorial presentation on how to make the most of these strategies whilst also introducing students to activities which could help them practice these strategies thus ensuring that they will be able to orientate their learning rather than depending on the teacher. The findings of the current study indicated that the students with no previous training in the vocabulary learning strategies agreed with other previous studies which found that Saudi students were trained in the proper use of the vocabulary learning strategies.
- Schools, in Saudi Arabia, should encourage students to exploit technology in studying rather than using it for enjoyment. Most students there use computers and the Internet for chatting, browsing social websites such as Facebook and Twitter and so on. They should be motivated to use computers and the Internet for learning and developing their knowledge. The new generation in Saudi Arabia can be described as a digital generation (Prensky, 2001).

7.7 Implications for further research

As this study is considered the first of its kind in Saudi Arabia, further research is needed in order to develop a better understanding of the vocabulary learning and the vocabulary learning strategies in an extensive vocabulary lesson supported with CALL multimedia. With this in mind, there are a number of implications for further research:

- Further research is needed on this field of VLS in a CALL environment, especially in the field of word solving strategies. Previous literature, as shown in Section 3.9, has been conducted in traditional learning environments. In this respect, more studies are recommended in this field in order to develop a better understanding of learners' use of these strategies.
- In addition to this, a larger sample would prove effective. Subjects should hail from different locations, areas, and stages of education. Indeed, investigation is needed into the vocabulary learning strategies' frequencies and actual perceptions towards them in a CALL environment in order to generalise the findings and also to ascertain which strategies best suit the traditional environment and which suit the CALL environment.
- It is also recommended that further studies on vocabulary learning strategy use with CALL and No-CALL at home are needed. This can be done by designing a task with a traditional method of learning and another with CALL programmes which can be used at home, such as for instance, homework. This is to assess how students use these strategies in a learning environment with no teacher present as students might do what their teacher instructs them to do.

- Female learners should not be neglected. Many studies found that gender is a factor which affects the choice of vocabulary learning strategies (e.g. Oxford and Grookball, 1990; Oxford, 1994). Oxford (1994: p.22-23) states that "Females were reported to use a wider range of strategies than males in many studies". Therefore, this study should be repeated but with female students. The researcher was not able to investigate female students as male researchers are not allowed to meet female students face-to-face in the department of English or to enter the girls section. The same limitations held for the effect of CALL multimedia on female students' achievements and attitudes towards CALL.

7.8 Contributions of this study

The present study is much more extensive than any other previous studies on vocabulary learning. It integrated two important and effective aspects for vocabulary learning and teaching, namely CALL and VLS, in one learning environment. However, the contributions of this study can be divided into two main types. The first type of contribution was a theoretical contribution which can be summarised as follows:

In Chapter 2:

- By providing details of the literature regarding Computer Assisted Language Learning (CALL). This included the definitions, history, models, developments, advantages, disadvantages and previous research on vocabulary in CALL environments.

- By providing details of the previous theories of learning, (behaviourism, constructivism and cognitivism), and technology.
- By shedding light on multimedia, involving its definitions and related theories. This was also supported by previous studies which investigated multimedia for vocabulary learning.
- Attitude's definitions with previous studies of learners' attitudes towards CALL have been provided.
- In addition to the above points, this study provided information regarding effect size with some calculations of effect size values in a number of studies which concentrated on vocabulary in both traditional and CALL learning environments.

In Chapter 3:

- Providing a descriptive analysis of the language learning strategies with a summary of their definitions, classifications and importance for L2 learners.
- Providing a detailed description of the vocabulary learning strategies which included previous taxonomies and studies, with specially focus on the word solving strategies.
- There was also a summary of the previous data collection research methods and environments used when researching vocabulary learning strategies.

With regard to the second type of contribution, these can be found below:

- The study practically investigated the effect of using CALL multimedia for vocabulary learning in a place where e-learning was not effectively used. This

study provided recommendations for educators and decision makers in Saudi Arabia, particularly in Majmaah University.

- This study also investigated the frequencies of word solving strategies use and its helpfulness perceptions in two different learning environments, (CALL and traditional), especially in Saudi Arabia. Indeed, this study, to the best of the researcher's knowledge and as supported by Scholfield (2011, personal contact), is considered the first study to focus on the frequencies of word solving strategies in a CALL classroom. This study can therefore be used as a framework for further research in this field.
- This study was the first study to concentrate on learners' perceptions towards the word solving strategies in both CALL and traditional environments, especially in Saudi Arabia. As seen in Section 3.9, all of the previous studies focused on the frequencies of these strategies and did not explore how students perceive them. This could also lay the foundations for further research which would research perceptions towards word solving strategies.
- This study calculated the effect sizes in the immediate and delayed post tests. Indeed, as is evident from the data analysis chapter the effect size calculation is neglected in a number of previous studies which concentrated on the effect of CALL on achievements.

7.9 Summary of this chapter

This chapter has aimed to summarise the entire thesis. This included the literature review chapters, the main findings derived from the answers to the research questions. It also clarified the limitations, recommendations, implications for further research and contributions of the current study.

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Appendixes

Appendix 1: Pre and delayed post - achievement tests

Please, translate the following words into Arabic, if you do not know the meaning leave it.

Word	***Its translation***	***Word***	***Its translation***
Sliding doors:		Patient	
Platform:		In-patient	
Crew:		Out-patient	
Fare:		Surgeon	
Tube:		Medical student	
Tip:		Casualty	
Cab:		Psychiatrist	
Lift:		Nurse	
Rack:		General practitioner	
Driver:		Specialist	
Taxi-rank:		Midwife	
Coach:		Pulse	
Meter:		Stethoscope	
Hail:		Operation'	
Metro:		Examine	
Double-decker:		Symptoms	
Inspector:		Operation	
Escalator:		Chemist	

Destination:		Temperature	
Subway:		Prescription	
Conductor:		Ward	
Rush hour:		Thermometer	
Tube:		Receptionist	
Check:		Treatment	
Single-decker		*Waiting room*	

اختبار

من فضلك , ترجم الكلمات التالية من الانجليزية إلى العربية. إذا لم تعرف المعنى تجاوزها:

الكلمة	ترجمتها	الكلمة	ترجمتها
Sliding doors:		Patient	
Platform:		In-patient	
Crew:		Out-patient	
Fare:		Surgeon	
Tube:		Medical student	
Tip:		Casualty	
Cab:		Psychiatrist	
Lift:		Nurse	
Rack:		General practitioner	
Driver:		Specialist	
Taxi-rank:		Midwife	
Coach:		Pulse	
Meter:		Stethoscope	
Hail:		Operation'	
Metro:		Examine	
Double-decker:		Symptoms	
Inspector:		Operation	
Escalator:		Chemist	
Destination:		Temperature	

Subway:		Prescription	
Conductor:		Ward	
Rush hour:		Thermometer	
Tube:		Receptionist	
Check:		Treatment	
Single-decker		*Waiting room*	

Appendix 2: Questionnaire (1) English version

Dear student,

This questionnaire is designed to gather important information that will help the researcher complete his project of Ph.D research. Your responses will be used for this purpose and will not affect your marks in terms of the module.

Thanks for your cooperation

This questionnaire will include questions about your previous knowledge and use of vocabulary learning strategies. Please select answers that reflect your opinion.

Section one

1- Have you been trained to use vocabulary learning strategies in your previous educational stages?

a. Yes ( ) b. No ( )

Section two

Here is a list of various vocabulary learning strategies. Please choose the most suitable answer:

When I meet new words while reading a passage, I use one or more of the following strategies :

1- I ask a friend, classmate … etc.

( ) Always

( ) Often

( ) Sometimes

( ) Seldom

( ) Never

2- I try to guess the meaning from the context.

( ) Always

( ) Often

( ) Sometimes

( ) Seldom

( ) Never

3- I consult a dictionary.

( ) Always

( ) Often

( ) Sometimes

( ) Seldom

( ) Never

4- I skip the unknown word.

( ) Always

( ) Often

( ) Sometimes

( ) Seldom

( ) Never

5- I ask a teacher.

( ) Always

( ) Often

( ) Sometimes

( ) Seldom

( ) Never

Thanks again

Pre-Questionnaire (1) Arabic version

استبانه (1)

عزيزي الطالب,

إن الغرض من هذه الاستبانه هو جمع معلومات تفيد دراستي في مرحلة الدكتوراه. جميع البيانات سوف تستخدم لها الغرض ولن يكون لها أي تأثير على درجات تحصيلك العلمي في المادة.

ارجوا منك اختيار الأجوبة المناسبة للأسئلة التالية:

الجزء الأول

1- هل سبق أن تدربت على استخدام طرق تعلم المفردات في مراحل التعليم السابقة؟

أ- نعم ( ) ب- لا ( )

الجزء الثاني

سوف تجد بالأسفل مجموعه من طرق تعلم المفردات الجديدة التي تواجهك أثناء القراءة. ارجوا منك اختيار الاجابه المناسبة للأسئلة التالية:

عندما تقابلني كلمات جديدة استخدم واحده أو أكثر من الطرق التالية لتعلم المفردة الجديدة

1- أسال زميلي , صديقي عن معنى الكلمة.

( ) دائما
( ) غالبا
( ) أحيانا
( ) نادرا
( ) ابدآ

2- أحاول أن أخمن معنى الكلمة الجديدة من خلال سياق الجملة.

( ) دائما
( ) غالبا
( ) أحيانا
( ) نادرا
( ) ابدآ

3- أستعين بالقاموس لمعرفة معنى الكلمة الجديدة.

( ) دائما
( ) غالبا
( ) أحيانا
( ) نادرا
( ) ابدآ

4- أتجاوز الكلمة التي لا افهم معناها.

( ) دائما
( ) غالبا
( ) أحيانا
( ) نادرا
( ) ابدآ

5- أسال مدرسي عن معنى الكلمة.

( ) دائما
( ) غالبا
( ) أحيانا
( ) نادرا
( ) ابدآ

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شاكر ومقدر تعاونك>>

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Appendix 3 : Immediate post test for lesson (1)

من فضلك , ترجم الكلمات التالية من الانجليزية إلى العربية. إذا لم تعرف المعنى تجاوزها:

الكلمة	ترجمتها	الكلمة	ترجمتها
sliding doors:		Hail:	
platform:		Metro:	
Crew:		Double-decker:	
Fare:		Inspector:	
Tube:		Escalator:	
Tip:		Destination:	
Cab:		Subway:	
Lift:		Conductor:	
Rack:		Rush hour:	
Driver:		Tube:	
Taxi-rank:		Check:	
Coach:		Single-decker	
Meter:			

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Appendix 4: Immediate post test for lesson (2)

من فضلك , ترجم الكلمات التالية من الانجليزية إلى العربية. إذا لم تعرف المعنى تجاوزها:

الكلمة	ترجمتها	الكلمة	ترجمتها
Patient		Operation	
In-patient		Examine	
Out-patient		Symptoms	
Surgeon		Operation	
Medical student		Chemist	
Casualty		Temperature	
Psychiatrist		Prescription	
Nurse		Ward	
General practitioner		Thermometer	
Specialist		Receptionist	
Midwife		Treatment	
Pulse		Waiting room	
Stethoscope			

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Immediate post test for lesson (1) English version

Please, translate the following words into Arabic, if you do not know the meaning leave it.

Word	***Its translation***	**Word**	***Its translation***
sliding doors:		Hail:	
platform:		Metro:	
Crew:		Double-decker:	
Fare:		Inspector:	
Tube:		Escalator:	
Tip:		Destination:	
Cab:		Subway:	
Lift:		Conductor:	
Rack:		Rush hour:	
Driver:		Tube:	
Taxi-rank:		Check:	
Coach:		Single-decker	
Meter:			

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Immediate post test for lesson (2) English version

Please, translate the following words into Arabic, if you do not know the meaning leave it.

Word	***Its translation***	***Word***	***Its translation***
Patient		Operation	
In-patient		Examine	
Out-patient		Symptoms	
Surgeon		Operation	
Medical student		Chemist	
Casualty		Temperature	
Psychiatrist		Prescription	
Nurse		Ward	
General practitioner		Thermometer	
Specialist		Receptionist	
Midwife		Treatment	
Pulse		Waiting room	
Stethoscope			

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Appemdix 5: Questionnaire (2) part 1
الاستبانة (2) الجزء الاول

عزيزي الطالب,
أشكرك على مشاركتك بالدروس الماضية, آمل منك إكمال الاستبانه التالية بناء على تجربتك في الدروس السابقة لمعرفة ما هي طرق تعلم المفردات إلي فضلت استخدامها أثناء تعلم الكلمات الجديدة وكذلك عن تجربتك تجاه تعلم المفردات بمساعدة الحاسب الآلي.

في البداية, ارجوا منك وضع علامة (√) مقابل المجموعة التي كنت تتبع إليها.
مجموعه الفصل الحاسوبي ( ) مجموعه الفصل التقليدي ( )

كل جدول من الجداول التالية يحتوي على طرق تعلم المفردات, ارجوا منك اختيار الإجابة المناسبة.

1- A- أتجاوز/ أتجاهل الكلمة التي لا افهم معناها.
أ- أنا..... استخدم طريقة اختبار الفهم عندما أواجه كلمة جديدة.

1- دائما ( ) 2- غالبا ( ) 3- أحيانا ( ) 4- نادرا ( ) 5-لست متأكدا ( )
ملاحظة: إذا كان جوابك رقم (5) تجاوز الفقرة (ب)
ب- هذه الطريقة تعتبر .....
1- مفيدة جدا ( )
2- مفيدة ( )
3- غير مفيدة ( )
4- غير مفيدة إطلاقا ( )
5- لست متأكد ( )

2- A-أسال زميلي عن معنى الكلمة الجديدة.
أ- أنا..... استخدم طريقة اختبار الفهم عندما أواجه كلمة جديدة.

1- دائما ( ) 2- غالبا ( ) 3- أحيانا ( ) 4- نادرا ( ) 5-لست متأكدا ( )
ملاحظة: إذا كان جوابك رقم (5) تجاوز الفقرة (ب)
ب- هذه الطريقة تعتبر .....
1- مفيدة جدا ( )
2- مفيدة ( )
3- غير مفيدة ( )
4- غير مفيدة إطلاقا ( )
5- لست متأكد ( )

3- A-اسأل مدرسي عن معنى الكلمة الجديدة.
أ- أنا..... استخدم طريقة اختبار الفهم عندما أواجه كلمة جديدة.

1- دائما ( ) 2- غالبا ( ) 3- أحيانا ( ) 4- نادرا ( ) 5-لست متأكدا ( )

ملاحظة: إذا كان جوابك رقم (5) تجاوز الفقرة (ب)
ب- هذه الطريقة تعتبر .....
1- مفيدة جدا ( )
2- مفيدة ( )
3- غير مفيدة ( )
4- غير مفيدة إطلاقا ( )
5- لست متأكد ( )

A-4-ابحث عن معنى الكلمة الجديدة بالقاموس.

أ- أنا..... استخدم طريقة اختبار الفهم عندما أواجه كلمة جديدة.

1- دائما ( ) 2- غالبا ( ) 3- أحيانا ( ) 4- نادرا ( ) 5-لست متأكدا ( )

ملاحظة: إذا كان جوابك رقم (5) تجاوز الفقرة (ب)

ب- هذه الطريقة تعتبر .....

1- مفيدة جدا ( )
2- مفيدة ( )
3- غير مفيدة ( )
4- غير مفيدة إطلاقا ( )
5- لست متأكد ( )

A -5-أخمن معنى الكلمة الجديدة من خلال النص.

أ- أنا..... استخدم طريقة اختبار الفهم عندما أواجه كلمة جديدة.

1- دائما ( ) 2- غالبا ( ) 3- أحيانا ( ) 4- نادرا ( ) 5-لست متأكدا ( )

ملاحظة: إذا كان جوابك رقم (5) تجاوز الفقرة (ب)

ب- هذه الطريقة تعتبر .....

1- مفيدة جدا ( )
2- مفيدة ( )
3- غير مفيدة ( )
4- غير مفيدة إطلاقا ( )
5- لست متأكد ( )

Questionnaire (2) Part 1 English version

Dear student,

In this questionnaire, you are asked to report about the preference and usefulness of the following vocabulary learning strategies, and your attitude and beliefs with regard to CALL, based on your experience in learning new words in previous lessons.

First, could you tick (√) with regard to which group you attend:

( ) Traditional group **( ) CALL group**

Each of the following boxes contain vocabulary learning strategies. Please, select answers that reflect your opinion.

1- Skip new word strategy **A- I** ……. **use this strategy when I meet new words.** ( ) Always ( ) Often ( ) Sometimes ( ) Seldom ( ) Never *If you did not select (Never), please move to question B*
B- This strategy is…… ( ) Strongly helpful. ( ) helpful. ( ) not helpful. ( ) Strongly not helpful. ( ) not sure.
2- Ask classmate strategy **A- I** ……. **use this strategy when I meet new words.** ( ) Always ( ) Often ( ) Sometimes ( ) Seldom ( ) Never *If you did not select (Never), please move to question B*
B- This strategy is…… ( ) Strongly helpful. ( ) helpful. ( ) not helpful. ( ) Strongly not helpful. ( ) not sure.
3- Ask teacher strategy **A- I** ……. **use this strategy when I meet new words.** ( ) Always ( ) Often ( ) Sometimes ( ) Seldom ( ) Never *If you did not select (Never), please move to question B*
B- This strategy is…… ( ) Strongly helpful. ( ) helpful. ( ) not helpful. ( ) Strongly not helpful. ( ) not sure.

4- Consult dictionary strategy

A- I …….. **use this strategy when I meet new words.**

( ) Always ( ) Often ( ) Sometimes ( ) Seldom ( ) Never

If you did not select (Never), please move to question B

B- This strategy is……

( ) Strongly helpful.
( ) helpful.
( ) not helpful.
( ) Strongly not helpful.
( ) not sure.

5- Guess from context strategy

A- I …….. **use this strategy when I meet new words.**

( ) Always ( ) Often ( ) Sometimes ( ) Seldom ( ) Never

If you did not select (Never), please move to question B

B- This strategy is……

( ) Strongly helpful.
( ) helpful.
( ) not helpful.
( ) Strongly not helpful.
( ) not sure.

Appendix 6: Questionnaire (2) Part 2

Dear student, *please choose answers that reflect your opinion on the following questions:*

1- Have you ever used the internet and/or educational computer programs for learning English?

1-( ) Strongly Agree
2-( ) Agree
3-( ) Disagree
4-( ) Strongly Disagree
5-( ) Not sure

2- Have you felt bored during lessons at the lab?

1-( ) Strongly Agree
2-( ) Agree
3-( ) Disagree
4-( ) Strongly Disagree
5-( ) Not sure

3- Do you support the use of computers in learning other subjects?

1-( ) Strongly Agree
2-( ) Agree
3-( ) Disagree
4-( ) Strongly Disagree
5-( ) Not sure

4- Did you make use of the vocabulary lessons as part of CALL?

1-( ) Strongly Agree
2-( ) Agree
3-( ) Disagree
4-( ) Strongly Disagree
5-( ) Not sure

5- Were the explanations and examples clear?

1-( ) Strongly Agree
2-( ) Agree
3-( ) Disagree
4-( ) Strongly Disagree
5-( ) Not sure

6- Do you think that learning vocabulary through the use of technology is better than the traditional way of learning?

1-( ) Strongly Agree
2-( ) Agree
3-( ) Disagree
4-( ) Strongly Disagree
5-( ) Not sure

7- Do you think that language labs are important in schools?

1-( ) Strongly Agree
2-( ) Agree
3-( ) Disagree
4-( ) Strongly Disagree
5-( ) Not sure

8- Do you intend to search the Internet for websites for language learning or using computers for learning English in future?

1-( ) Strongly Agree
2-( ) Agree
3-( ) Disagree
4-( ) Strongly Disagree
5-( ) Not sure

9- Was the Hot Potatoes activity useful?

1-( ) Strongly Agree
2-( ) Agree
3-( ) Disagree
4-( ) Strongly Disagree
5-( ) Not sure

10- Was the explanation by the PowerPoint useful?

1-( ) Strongly Agree
2-( ) Agree
3-( ) Disagree
4-( ) Strongly Disagree
5-( ) Not sure

Thank you

Questionnaire (2) Part 2: Arabic version

الاستبانة (2)

الجزء الثاني

عزيزي الطالب, من فضلك اختر الإجابة التي تناسبك أو تعكس انطباعك للإجابة على الأسئلة التالية:

1- هل سبق أن استخدمت الحاسب الآلي أو الانترنت أو أي برامج لتعلم اللغة الانجليزية؟

1- دائما ( )

2- غالبا ( )

3- أحيانا ( )

4- نادرا ( )

5-لست متأكدا ( )

2- هل شعرت بالممل أثناء الدروس التي حضرتها بمعمل اللغة؟

1- دائما ( )

2- غالبا ( )

3- أحيانا ( )

4- نادرا ( )

5-لست متأكدا ( )

3- هل تؤيد استخدام الحاسب الآلي في تعلم المواد الدراسية؟

11- دائما ( )

2- غالبا ( )

3- أحيانا ( )

4- نادرا ( )

5-لست متأكدا ( )

4- هل استفدت من دروس المفردات التي تمت بمعمل اللغة؟

1- دائما ( )

2- غالبا ( )

3- أحيانا ( )

4- نادرا ( )

5-لست متأكدا ( )

5- هل كان الشرح والأمثلة واضحة؟

11- دائما ( )

2- غالبا ( )

3- أحيانا ( )

4- نادرا ( )

5-لست متأكدا ( )

6- هل تعتقد أن تعلم مفردات اللغة من خلال استخدام التكنولوجيا يعتبر أفضل من طريقة التعلم التقليدية؟

11- دائما ( )

2- غالبا ( )

3- أحيانا ( )

4- نادرا ( )

5-لست متأكدا ( )

7- هل تعتقد أن معامل اللغة مهم وجودها بالمدارس والكليات؟

1- دائما ( )

2- غالبا ( )

3- أحيانا ( )

4- نادرا ( )

5-لست متأكدا ( )

8- هل سوف تقوم مستقبلا بالبحث عن مواقع انترنت او سوف تستخدم أجهزة الحاسب للتعلم اللغة الانجليزية؟

1- دائما ( )

2- غالبا ( )

3- أحيانا ( )

4- نادرا ( )

5-لست متأكدا ( )

9- هل كانت التمارين المصممة على الحاسب مفيدة؟

1- دائما ( )

2- غالبا ( )

3- أحيانا ( )

4- نادرا ( )

5-لست متأكدا ( )

10- هل كانت الدروس المعروضة على الشرائح مفيدة؟

1- دائما ( )

2- غالبا ( )

3- أحيانا ( )

4- نادرا ( )

5-لست متأكدا ( )

انتهت الاستبانة

شكرا لك

Appendix 7: Consent Form in English

Name: .....
□ Student in level (1, 2,3,4) / □ Teacher

I hereby □ agree / □ disagree to participate in the study as part of the researcher doctoral research.

Signature

Consent form in Arabic

Appendix 8: PowerPoint Lessons

Vocabulary Building
Lesson 1
Public Transports

Platform

- It means a long flat raised structure at a railway station, where people get on and off trains.



Crew

- A group of persons involved in a particular kind of work or working together:
- Ex. *the crew of a train.*



Fare

- The price of conveyance or passage in a bus, train, airplane, or other vehicle.


Tube

- An underground (British).



Tip

- A small amount of money given to someone who has provided you with a service, in addition to the official payment and for their personal use.
- Ex. He **gave** the porter a tip.



Cab

- A taxi.

Lift

- (US elevator) a device like a box which moves up and down, carrying people or goods from one floor of a building to another or taking people up and down underground in a mine.

Rack

- A shelf on a train or a bus on which you can put your bags and cases.




Driver

- Someone who drives a vehicle .


Taxi-rank

- A place where taxis wait for customers.



Coach

- (US usually bus) a long motor vehicle with comfortable seats, used to take groups of people on journeys.
- Ex. We're going to the airport **by** coach.



Meter

- the device in a taxi that measures the distance or the amount of time spent travelling and shows how much you have to pay.
- Ex. The taxi driver left the meter **running** while I helped Mum to her front door.



Hail

- slightly formal to call someone in order to attract their attention.
- Ex. Shall we hail a taxi?



Metro

- an underground electric railway system in some cities, especially in France.
- Ex. Let's **go by** Metro.



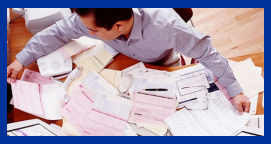
Double-decker

- A tall bus with two levels .



Inspector

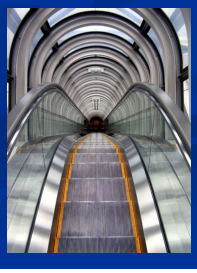
- someone whose job is to officially inspect something.
- Ex. A tax inspector



Escalator

- A set of stairs moved up or down by electric power on which people can stand and be taken from one level of a building to another, especially in shops, railway stations and airports.
- Ex. I'll meet you by the **up/down** escalator on the second floor.





Destination

- The place where someone is going or where something is being sent or taken.
- Ex. We **arrived at** our destination tired and hungry.


Subway

- Mainly US a railway system in which electric trains travel along passages below ground
- Ex. We took the subway uptown to Yankee Stadium.



Bus Stop

- A place, usually with a pole with a sign, where a bus stops to allow passengers to get on and off.




Conductor

- Someone whose job is to sell tickets on a bus, train or other public vehicle.


Rush hour

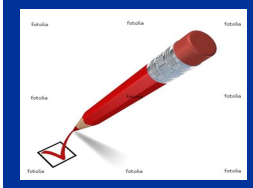
- The busy part of the day when towns and cities are crowded, either in the morning when people are travelling to work, or in the evening when people are travelling home.
- Ex. Rush hour traffic.

Sliding Doors

- Doors open smoothly.

Check

- To make certain that something or someone is correct, safe or suitable by examining it or them quickly.
- Ex. You should always check your oil, water and tyres before taking your car on a long trip.



Single-decker

- A bus or other vehicle which has only one level.

Vocabulary Building
Lesson 2

Doctors and Hospitals

Patient

- A person who is under Medical care or treatment.

Psychiatrist

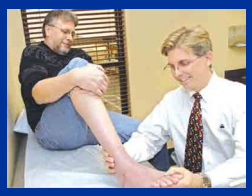
- Person who helps people with mental problems.

In-patient

- Sick person has to stay in hospital.

Specialist

- Person who specializes in one area of medical treatment.




Casualty

- Person badly injured in an accident, fire, war .. etc.


Out-patient

- Sick person who has to visit the hospital regularly for treatment.


Surgeon

- Someone who operates on sick people.



Nurse

- Someone who looks after sick people in hospital.

Thermometer

- an instrument for measuring temperature, often a sealed glass tube that contains a column of liquid, as mercury, that expands and contracts, or rises and falls, with temperature changes, the temperature being read where the top of the column coincides with a calibrated scale marked on the tube or its frame.

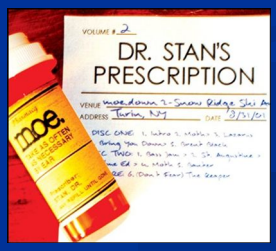
Ward

- a division, floor, or room of a hospital for a particular class or group of patients: a convalescent ward; a critical ward.



Prescription

- a direction, usually written, by the physician to the pharmacist for the preparation and use of a medicine or remedy.

Operation

- a procedure aimed at restoring or improving the health of a patient, as by correcting a malformation, removing diseased parts, implanting new parts, etc.



Stethoscope

- an instrument used in auscultation to convey sounds in the chest or other parts of the body to the ear of the examiner.


Pulse

- the regular throbbing of the arteries, caused by the successive contractions of the heart, esp. as may be felt at an artery, as at the wrist.

Receptionist

- a person employed to receive and assist callers, clients, etc., as in an office.

Appointment

- a fixed mutual agreement for a meeting; engagement: We made an appointment to meet again.

Chemist

- 1. a specialist in chemistry.
- 2. *British* . a druggist.

Symptoms

- any phenomenon or circumstance accompanying something and serving as evidence of it.

Examine

- to observe, test, or investigate (a person's body or any part of it), esp. in order to evaluate general health or determine the cause of illness.

Treatment

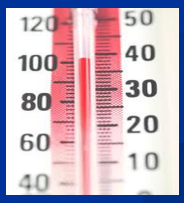
- management in the application of medicines, surgery, etc.

Waiting room

- a room for the use of persons waiting, as in a railroad station or a physician's office.

Temperature

- a measure of the warmth or coldness of an object or substance with reference to some standard value. The temperature of two systems is the same when the systems are in thermal equilibrium.



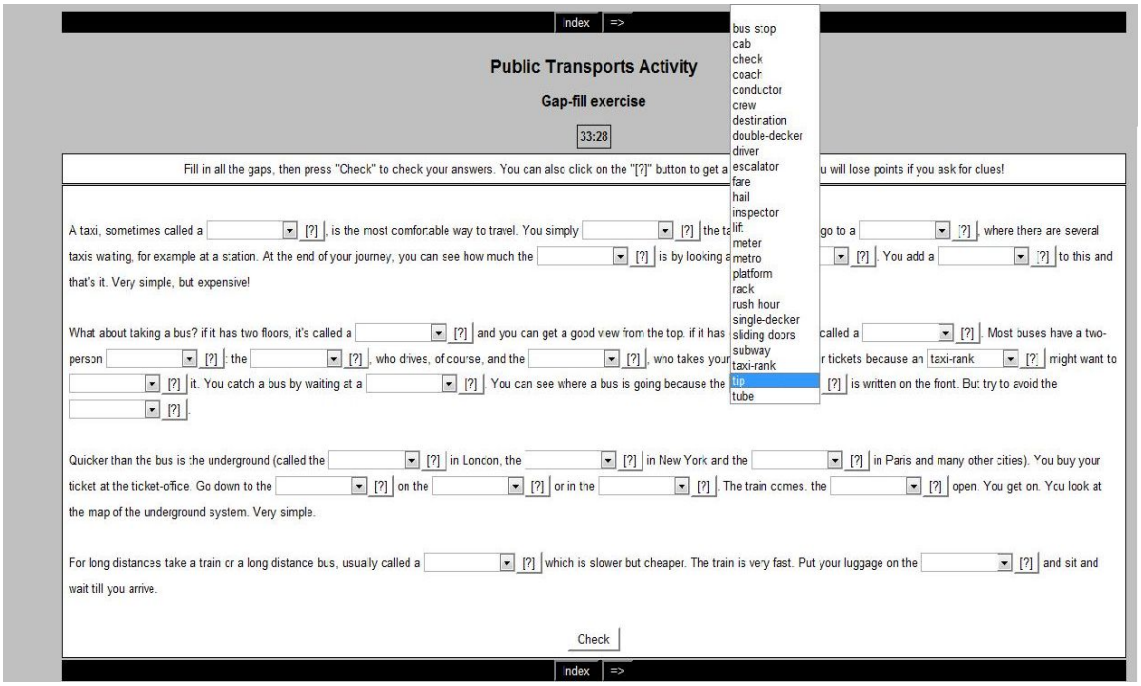
General practitioner

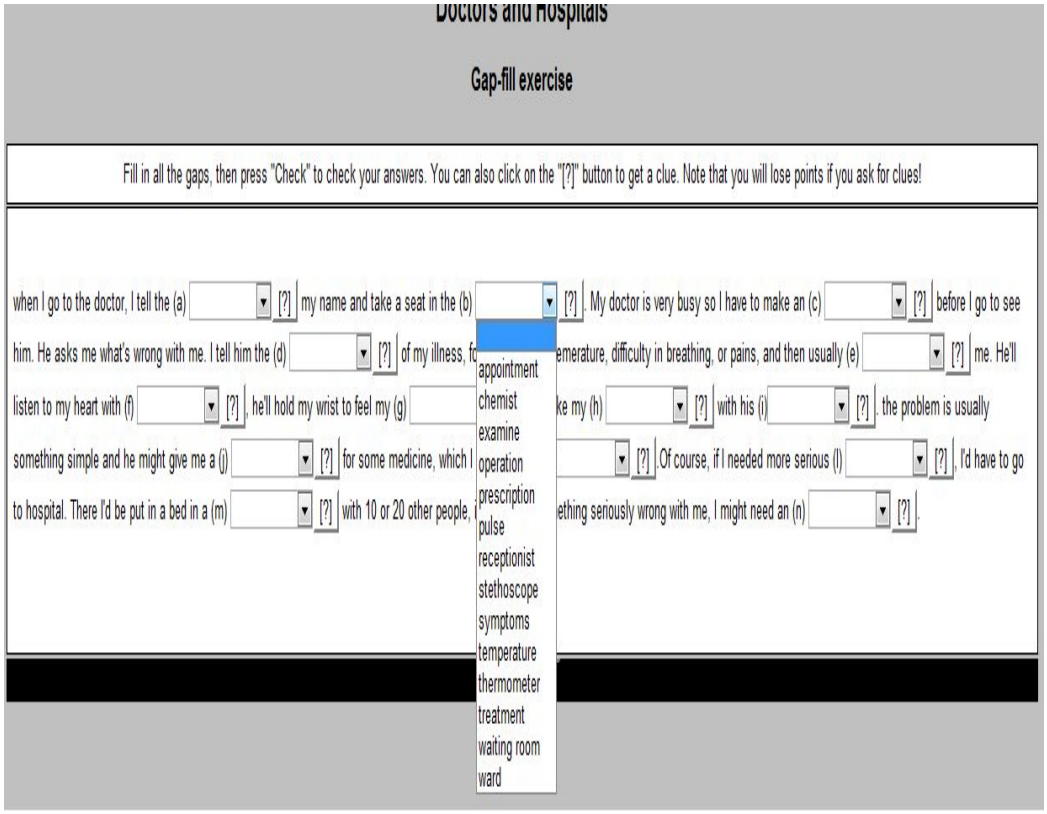
- a Medical practitioner whose practice is not limited to any specific branch of medicine or class of diseases. Abbreviation: G.P.

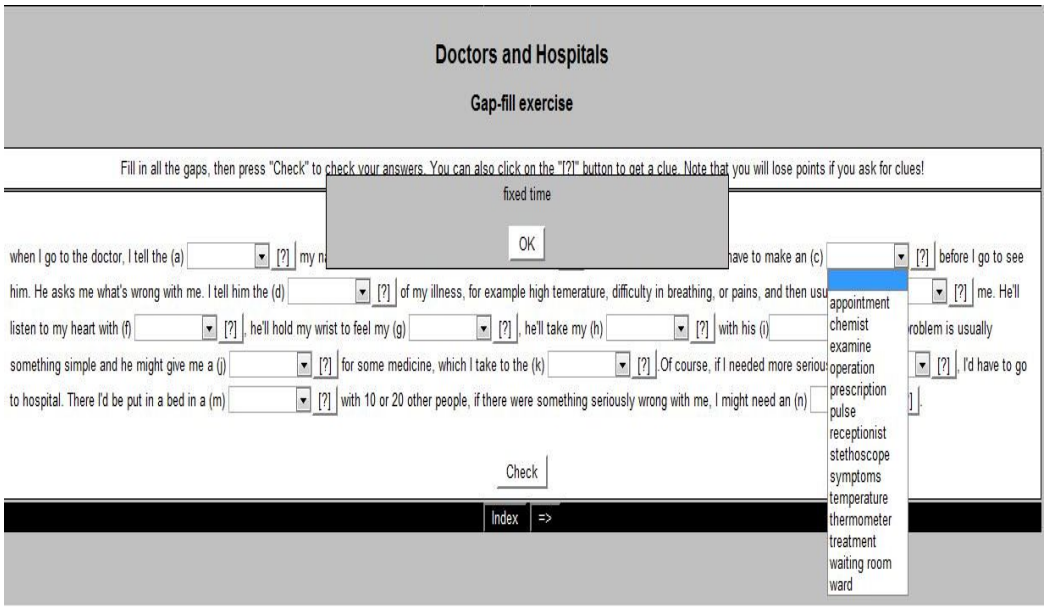
Midwife

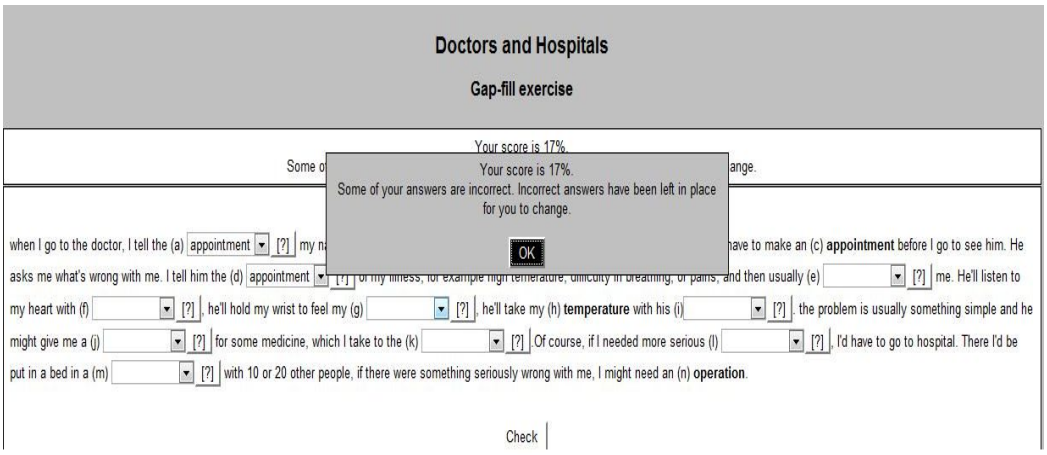
- a person trained to assist women in childbirth.

Appendix 9 : Vocabulary Activity by Hot Potato

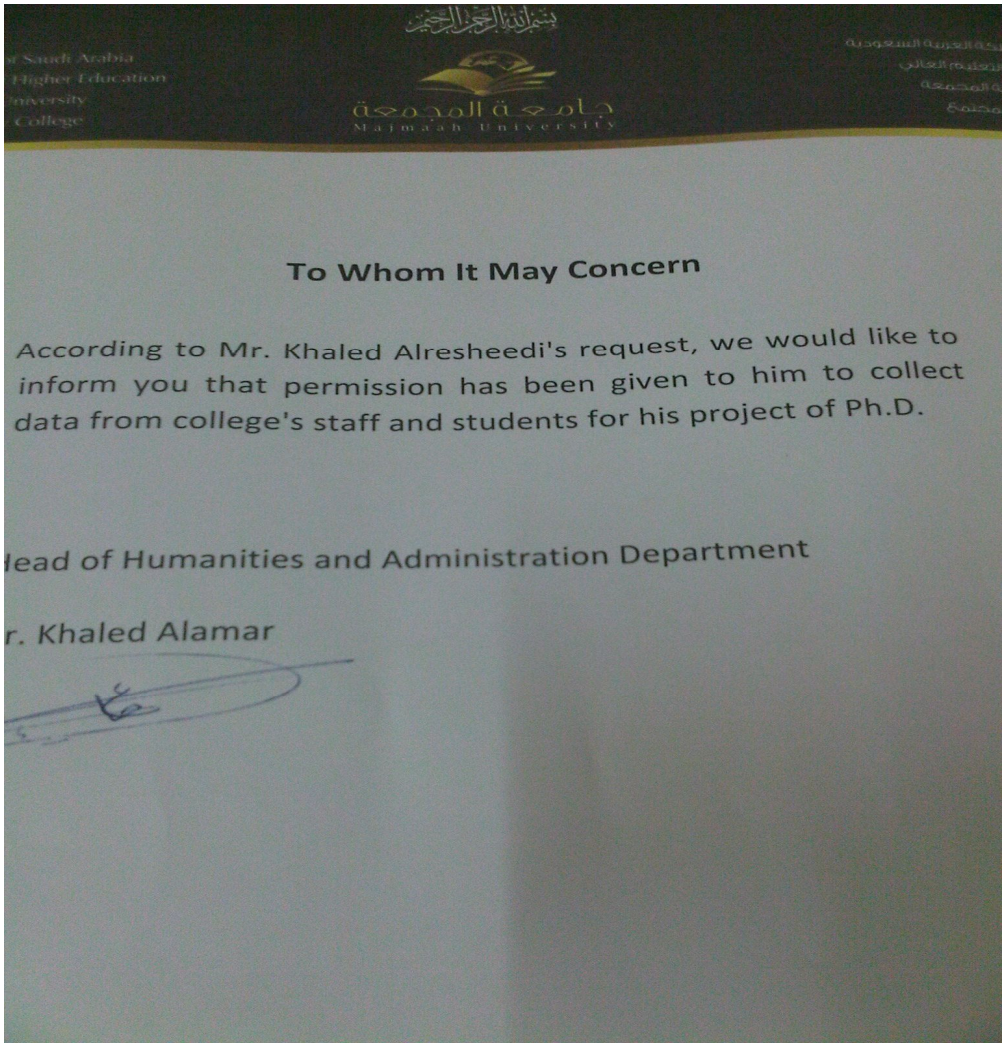





Doctors and Hospitals
Gap-fill exercise
Fill in all the gaps, then press "Check" to check your answers. You can also click on the "[?]" button to get a clue. Note that you will lose points if you ask for clues!
fixed time
OK
when I go to the doctor, I tell the (a) [?] my na
have to make an (c) [?] before I go to see
him. He asks me what's wrong with me. I tell him the (d) [?] of my illness, for example high temerature, difficulty in breathing, or pains, and then usu [?] me. He'll
listen to my heart with (f) [?], he'll hold my wrist to feel my (g) [?], he'll take my (h) [?] with his (i)
roblem is usually
something simple and he might give me a (j) [?] for some medicine, which I take to the (k) [?]. Of course, if I needed more seriou [?], I'd have to go
to hospital. There I'd be put in a bed in a (m) [?] with 10 or 20 other people, if there were something seriously wrong with me, I might need an (n) [?].
appointment
chemist
examine
operation
prescription
pulse
receptionist
stethoscope
symptoms
temperature
thermometer
treatment
waiting room
ward
Check
Index =>


Doctors and Hospitals
Gap-fill exercise
Your score is 17%.
Some o
ange.
Your score is 17%.
Some of your answers are incorrect. Incorrect answers have been left in place for you to change.
OK
when I go to the doctor, I tell the (a) appointment [?] my na
have to make an (c) appointment before I go to see him. He
asks me what's wrong with me. I tell him the (d) appointment [?] of my illness, for example high temerature, difficulty in breathing, or pains, and then usually (e) [?] me. He'll listen to
my heart with (f) [?], he'll hold my wrist to feel my (g) [?], he'll take my (h) temperature with his (i) [?], the problem is usually something simple and he
might give me a (j) [?] for some medicine, which I take to the (k) [?]. Of course, if I needed more serious (l) [?], I'd have to go to hospital. There I'd be
put in a bed in a (m) [?] with 10 or 20 other people, if there were something seriously wrong with me, I might need an (n) operation.
Check

Appendix 10: Permission for collecting data from university



بسم الله الرحمن الرحيم

Saudi Arabia
Higher Education
niversity
College

جامعة المجمعة
Majmaah University

To Whom It May Concern

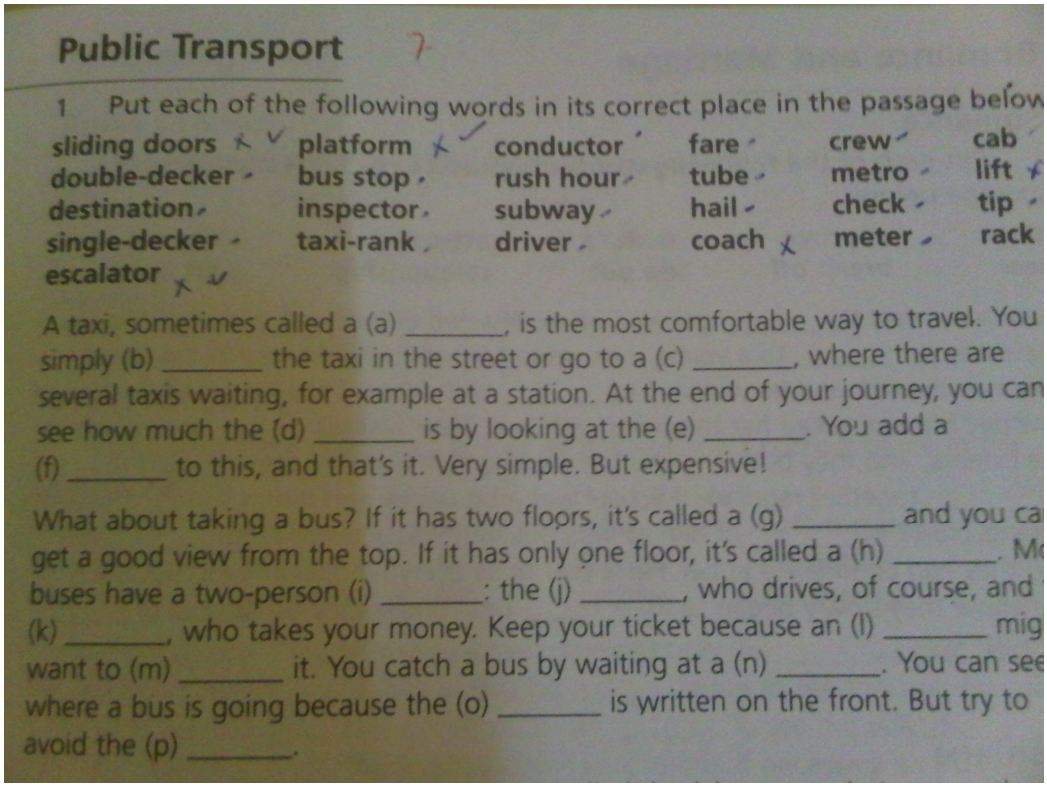
According to Mr. Khaled Alresheedi's request, we would like to inform you that permission has been given to him to collect data from college's staff and students for his project of Ph.D.

lead of Humanities and Administration Department

r. Khaled Alamar

Appendix 11: Vocabulary Lesson (1)

Public transport



Public Transport

1 Put each of the following words in its correct place in the passage below

sliding doors	platform	conductor	fare	crew	cab
double-decker	bus stop	rush hour	tube	metro	lift
destination	inspector	subway	hail	check	tip
single-decker	taxi-rank	driver	coach	meter	rack
escalator					

A taxi, sometimes called a (a) _____, is the most comfortable way to travel. You simply (b) _____ the taxi in the street or go to a (c) _____, where there are several taxis waiting, for example at a station. At the end of your journey, you can see how much the (d) _____ is by looking at the (e) _____. You add a (f) _____ to this, and that's it. Very simple. But expensive!

What about taking a bus? If it has two floors, it's called a (g) _____ and you can get a good view from the top. If it has only one floor, it's called a (h) _____. Most buses have a two-person (i) _____: the (j) _____, who drives, of course, and (k) _____, who takes your money. Keep your ticket because an (l) _____ might want to (m) _____ it. You catch a bus by waiting at a (n) _____. You can see where a bus is going because the (o) _____ is written on the front. But try to avoid the (p) _____.

Appendix 12: Vocabulary Lesson (2)

Doctors and Hospitals

Doctors and Hospitals

Medical staff and patients

1 Match each person on the right with a definition on the left.

(a) an ordinary doctor	patient
(b) someone who looks after sick people in hospital	surgeon
(c) person who helps people with mental problems	out-patient
(d) sick person receiving treatment	in-patient
(e) sick person who has to stay in hospital	medical student
(f) sick person who has to visit hospital regularly for treatment	casualty
(g) someone who operates on sick people	psychiatrist
(h) person badly injured in an accident, fire, war	nurse
(i) person who helps at the birth of a baby	general practitioner
(j) person who studies to be a doctor	specialist
(k) person who specializes in one area of medical treatment	midwife

Doctors' surgeries and hospitals

2 Put each of the following words in its correct place in the passage below.

thermometer ward prescription operation stethoscope pulse receptionist appointment chemist symptoms examine treatment waiting room temperature

When I go to the doctor, I tell the (a) _____ my name and take a seat in the (b) _____. My doctor is very busy so I have to make an (c) _____ before I go to see him. He asks me what's wrong with me, I tell him the (d) _____ of my illness, for example high temperature, difficulty in breathing, or pains, and then he will usually (e) _____ me. He'll listen to my heart with his (f) _____, he'll hold my wrist to feel my (g) _____, he'll take my (h) _____ with his (i) _____. The problem is usually something simple and he might give me a (j) _____ for some medicine, which I take to the (k) _____. Of course, if I needed more serious (l) _____, I'd have to go to hospital. There I'd be put in a bed in a (m) _____ with 10 or 20 other people. If there were something seriously wrong with me, I might need an (n) _____.

Appendix 13: Scatter plot for the correlations between WSS use and perception

Figure 3: in CALL classroom

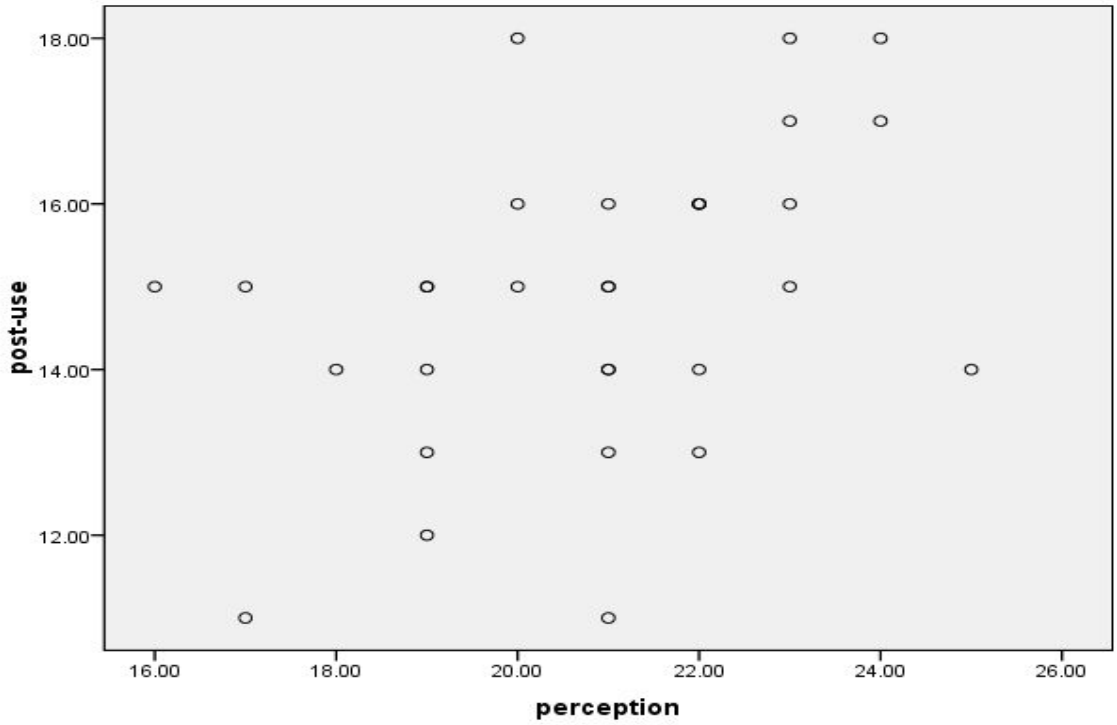
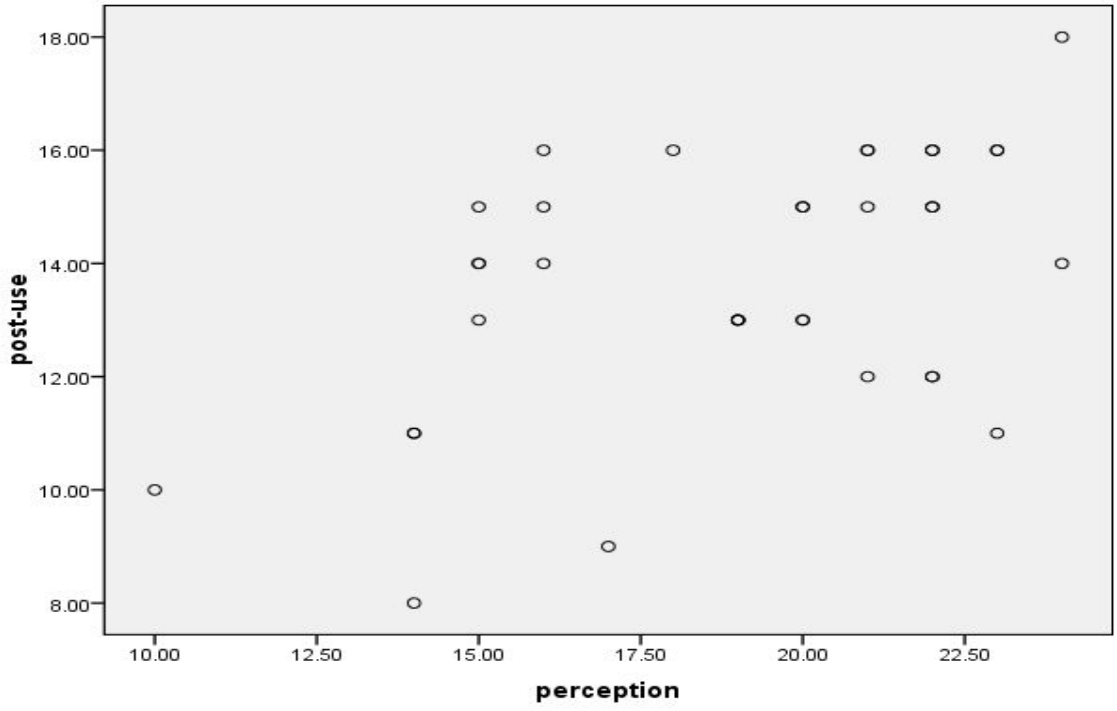


Figure 4: in traditional classroom



Appendix 14: Transcripts of students' interview

Student no.1

Q1- What is your impression towards using computers for learning?

It supports learning such reading and listening contrary to traditional writing and conversation which requires humans to develop it.

Q2- What were the learning strategies that you have used to recognize the meaning of new words with examples?

I prefer electronic dictionaries and encyclopedias as they translate fast and you do not need to spend long time to understand the text. For example, copy and paste the text in Google translator or use Babylone translator which gives you the meaning of the new words instantly by pressing on ALT+ right click on the mouse. Also, copying the new word to Word Processor and translate it.

Q3- Have you felt bored when learning with computers? Why?

No, I have not. Because you do not feel that somebody is following you when answering the questions. Learning freely and without fears of committing mistakes increase the chances of learning and improvement.

Q4- Do you think that computers are important in schools?

Yes to increase opportunities of repeating the information as much as you want such as listening to specific text frequently and instant translation contrary to paper texts which take long time to translate.

Q5- if you have used computers for learning, what programs have you used?

Google, Byblone and Word Processor.

Thanks

Transcripts of Student (2)

Q1- What is your impression towards using computers for learning?

Good.

Q2- What were the learning strategies that you have used to recognize the meaning of new words with examples?

I search the new word in websites.

I search the new word put in sentences and guess the meaning.

I copy and put it in Google translator to translate it.

I search for online translator in Google.

Q3- Have you felt bored when learning with computers? Why?

No. because computers are very useful for language learning in this time.

Q4- Do you think that computers are important in schools?

Yes. It helps students understand lessons.

Q5- if you have used computers for learning, what programs have you used?

I use Four English Website.

YouTube to look for video lessons for learning language.

Transcript of Student (3)

Q1- What is your impression towards using computers for learning?

I find learning with computers is very difficult for me as I seldom use it. I prefer paper books and notes to learn.

Q2- What were the learning strategies that you have used to recognize the meaning of new words with examples?

I ask someone who might be better than me about the meaning of the new word and I use it in sentences until I keep it. If I used internet, I use Google to learn anything.

Q3- Have you felt bored when learning with computers? Why?

I felt bored because I used to learn in traditional classes and the teacher teach the lesson in class.

Q4- Do you think that computers are important in schools?

Yes, they are important as they may help in learning the language.

Q5- if you have used computers for learning, what programs have you used?

Google as I can translate the whole text or a sentence.

Transcript of Student (4)

Q1- What is your impression towards using computers for learning?

Very Excellent as I can learn in many ways

Q2- What were the learning strategies that you have used to recognize the meaning of new words with examples?

I used the mobile device to translate the new words and then repeat the word orally until I keep it.

Q3- Have you felt bored when learning with computers? Why?

No as I when I use computers I can open many programs and time elapses fast.

Q4- Do you think that computers are important in schools?

Yes as it helps in improving students and learning.

Q5- if you have used computers for learning, what programs have you used?

Wafi translator, Google for translation and listening and I buy books or useful educational programs via internet.

Transcript of student (5)

Q1- What is your impression towards using computers for learning?

Useful and there are many ways to learn language.

Q2- What were the learning strategies that you have used to recognize the meaning of new words with examples?

I used 1- writing down the new word in a note to revise it many time until I keep it. 2- I listen to the pronunciation of the new word frequently until I know it. 3- take notes in margins.

Q3- Have you felt bored when learning with computers? Why?

It depends on the program I am using, but generally I prefer studying with computers as they have many features.

Q4- Do you think that computers are important in schools?

Yes as it help in calculation and arrangement and it ease the learning process.

Q5- if you have used computers for learning, what programs have you used?

I used many ways:

1- cross words programs with English words. it is a useful game. Also, word and alphabet order.

2- online English quizzes which include different levels in language.

Appendix 15 : Author's Published Papers

Papers published in Proceedings of EDULEARN12 Conference. 2nd-4th July 2012, Barcelona, Spain.

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PAPER 1:

THE EFFECT OF A CALL MULTIMEDIA CLASSROOM ON LEARNERS' VOCABULARY LEARNING AND THEIR ATTITUDES TOWARDS CALL COMPARED WITH A TRADITIONAL CLASSROOM ENVIRONMENT

PAPER 2:

FREQUENCIES OF WORD SOLVING STRATEGY USE AND THEIR PERCEIVED HELPFULNESS IN CALL AND TRADITIONAL LEARNING CLASSROOMS

THE EFFECT OF A CALL MULTIMEDIA CLASSROOM ON LEARNERS' VOCABULARY LEARNING AND THEIR ATTITUDES TOWARDS CALL COMPARED WITH A TRADITIONAL CLASSROOM ENVIRONMENT

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Abstract

This study investigated the effect of a CALL multimedia classroom on L2 learners' vocabulary learning compared with a traditional learning classroom environment and their attitudes towards using CALL multimedia. The participants of the study were 67 Saudi male students majoring in English in the first year of a BA course in Majmaah University, KSA. The participants were divided into two groups. The first group were from the Community College and represented the CALL group (n=31). The second group were from the Administrative Sciences and Humanities College and represented the traditional group (n=36). Both qualitative and quantitative data collection methods were used. These included a pretest, immediate and delayed post tests, questionnaire and interview. The findings of the study showed that both groups' learned a significant number of the target L2 words after the implementation of the study, but the CALL group outperformed the traditional group, and the difference between the two scores was statistically significant in both the immediate and delayed post tests. Also, the effect size calculations showed that the intervention (CALL multimedia) has a large impact on the treatment group (CALL group) in both the immediate and delayed post tests. Also, the findings showed that the CALL learners have positive attitudes towards using CALL for vocabulary learning and strongly support integrating CALL into schools.
Key words: Computer Assisted Language Learning, CALL, Multimedia, Vocabulary Learning.

Introduction

Previous research on Computer Assisted Language Learning (CALL) and multimedia indicate that this method is effective for vocabulary learning and teaching. Despite this, this method is still not widely used in most Saudi schools. One of the reasons suggested [1] that students in Saudi Schools leave classes without learning vocabulary efficiently is the poor presentation of L2 vocabulary, which is limited to explaining the meaning and pronunciation of L2 words by the teacher. Therefore, in this current study, the L2 words were taught and learned by CALL multimedia methods as part of the curriculum. This was compared with learning the same words, but with traditional learning and teaching methods found in Saudi Schools.

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Literature Review

Computer Assisted Language Learning

The history of CALL began in the late 1950s [2]. CALL has been investigated by many researchers and defined [3] as "the search for and study of applications of the computer in language teaching and learning" (p.1) and as [4] the use of a computer for either teaching or learning a language. In the history of this field there are two key terms [5] terms related to CALL. The first is Computer Assisted Learning (CAL), which is commonly used in the United Kingdom. The second is Computer Assisted Instruction (CAI), which is more commonly used in the USA. CAI has been defined [6] as any strategy or approach using computers for instruction and included computer-assisted, computer-based, or computer-aided forms of instruction involving computers. CALL is used in a broad sense [3] and can cover any use or involvement of a computer for language learning, such as the use of standard programs such as a Word Processor, the Internet or email. However, CALL has been developed over the last decades [7] as technology itself has been developed. These developments can be classified into three phases: Behaviourist CALL (1960s-1970s), Communicative CALL (1970s-1980s) and Integrative CALL (1980s-present).

CALL Multimedia

Multimedia encompasses a range of different ideas [8]. Such as “the combined use of several media, such as movies, slides, music, and lighting, especially for the purpose of education or entertainment” ([9] p.17) or as [10] any computerized program that includes text with at least one element of the following: sound, video, graphics, music or animation. CALL multimedia therefore is any combination of text with picture and/or sound or video for language learning or teaching purposes. This is based on Mayer’s [11] Multimedia theory of learning. He stated that the principle of multimedia theory is that learners learn more deeply from the combination of words and pictures than from only words. However, he extrapolated his theory from three theories: Cognitive Load theory [12], Dual-coding Theory [13] and the Working Memory Model [14].

CALL and learners' motivation

Previous research on CALL [15] indicated that the integration of technology into the classroom was very effective and positively affected the students' motivation and interest in learning. This integration helps to increase classroom interaction as well [16] and “learner's motivation is the crucial factor for acquiring a foreign language, and new technology greatly contributes to both English language teaching and learning”. ([17] p.120)

Previous studies on CALL's effect on students' achievement and attitudes

Many researchers have investigated the effect of CALL on learners' achievements and their attitudes towards using CALL for language learning, particularly vocabulary learning. Most [18] of the previous investigations into the effect of using CALL on learners’ achievements have found that the achievements of learners increased compared to learners in conventional classrooms. Almekhlafi [19] investigated the impact of CALL on 83 Arab learners' achievements and their attitudes. He used an experimental design and divided the participants into two groups: 40 as the

experimental group and 43 as the control group. He pretested the participants' level of vocabulary knowledge to measure any improvement in their achievements in the post test. The experimental group's attitudes towards this experience were collected using a questionnaire. The findings of his study showed that the experimental group outperformed the control group in the achievement post-tests, and the difference between the two groups was statistically significant. He also found that positive attitudes towards CALL have been reported by the CALL group.

Aljarf [20] researched the effect of online instruction learners' achievements and attitudes when learning L2 vocabulary. 53 Saudi students were the sample of her study. The participants were pre- and post-tested to identify their vocabulary knowledge of 250 L2 words. Their attitudes towards this experience were collected using a questionnaire. The analysis results showed that the learner's achievements improved after the study and the difference between the two means was statistically significant. Her participants reported that they have very positive attitudes towards this experience. More recently, Arishi [21] explored the attitudes of 70 Saudi male students towards CALL for English learning during orientation year at College. Both interview and observational data collection methods were used. The findings showed that students has positive attitudes towards CALL. He mentioned that these positive attitudes towards CALL might be because that students' felt that CALL will support their success. Alresheedi [5] also investigated the attitudes of 15 L2 learners in the third year of secondary school. He used a questionnaire to gather the necessary data. The vocabulary lesson was designed by PowerPoint and presented through using a computer and projector. He found that the participants liked this method of presenting vocabulary and enjoyed this experience.

Kayaoğlu and colleagues [22] investigated the impact of CALL multimedia on learners' achievements and attitudes. 39 L2 learners, who were divided into two groups, participated in this study. 22 of them represented the control group and 17 learners represented the experimental group. Pre-test and post-test were used to identify the learners' achievements before and after the study. In addition, interviews with the experimental and observation group were used. The findings showed that the experimental group outperformed the control group, but the difference was not statistically significant. The experimental group reported positive attitudes towards CALL for vocabulary learning.

Research into multimedia and vocabulary learning

A number of researchers hace investigated the use of multimedia for vocabulary learning compared with traditional methods of learning vocabulary. Akbulut [23] researched the use of multimedia for vocabulary learning by 69 Turkish EFL learners at a Turkish university. The participants were divided into three groups randomly – text only, picture only and both. Pre-test and immediate and delayed post tests were used. The results showed that the text and picture group achieved higher scores among other groups in both immediate and delayed post tests. Yoshii and Flaitz [24] also explored the effectiveness of using text only, picture only and both types annotation. 151 ESL students participated in this study. Immediate and delayed post tests were administered after the study. They found that the group of text and picture outperformed the other groups in both the immediate and delayed post-tests. Also, Luac and colleagues [17] explored the effects of using educational multimedia software on learning L2 words and learners attitudes toward this experience. 43 Croatian students, who were divided into two groups, participated in this study. They

found that the participants' vocabulary knowledge, in the multimedia classroom, were higher than the learners' in the traditional classroom.

methodology

The current study was conducted to investigate how CALL multimedia would affect the learners' achievements with L2 word learning and what attitudes they had towards this experience. This was compared with learning the same words, but with traditional methods of teaching and learning.

Hypothesis of the study

The current study tests the following hypothesis: there is no significant difference (at the .050 level), between the achievements of students in CALL multimedia classrooms and the achievements of students in traditional classrooms, with regards to learning L2 words.

Research questions

1- Are there statistically significant differences between the achievements of learners in the CALL multimedia classrooms and those in the traditional classrooms in the immediate and delayed post-tests?

2- What attitudes do learners in CALL multimedia classrooms have towards using CALL multimedia for vocabulary learning?

Research method and design

The current study use an experimental method. An experimental approach is usually considered [25] the most powerful method to establish a cause and effect relationship between variables. With regard to the research design, quasi-experimental design was used to test the hypothesis of the study. This type of design requires at least two groups of participants [26].

Participants

67 Saudi male students, from Majmaah University in Saudi Arabia, participated in this study. They were studying in English department at the first year of BA. One class was chosen at random to be the experimental class, the other assigned to the control condition. The first group consisted of 31 learners from Community College representing the experimental group (CALL group). The second group consisted of 36 students from Administrative Sciences and Humanities (currently education) College, representing the control group. Both groups were homogenous as they all have studied English for six years in their previous educational stages. Their average age is between 19-20 years old.

Data collection instruments

The researcher used pre-tests and, immediate and delayed post-tests to investigate the students' achievements before and after the study. Also, a questionnaire was administered to the students to identify their attitudes towards CALL. The participants were required to answer 10 questions by selecting one of five Likert scale answers (Strongly agree, agree, disagree, strongly disagree, not sure). The questionnaire was piloted by consulting experts in the field of applied linguistics and statisticians about

its content and structure. The internal reliability was calculated and the Cronbach Alpha value was .82, which means that was acceptable and ready for administration. In addition, five students were interviewed to see their attitudes towards this experience.

Pretest

The researchers pretested the participants with regard to their knowledge of the 50 target words, which will be taught in two different learning classrooms, to make sure that they are equivalent. The following table 1 shows the mean scores of the pre-tests:

Table 1: Descriptive statistics of pre-tests result

Test	Group	N	M	SD	Sig
Pre-test	CALL	31	51.38	1.47	.22
	Traditional	36	50.97	1.20	

N= Number, M= Mean, SD=Standard Deviation, Sig=Significant

As seen above, there was a small difference between the two means of the two groups. Therefore, an independent samples t-test was run to see whether or not the difference is statistically significant. The result showed that it was not significant as the p value was .22. So, this result confirms the equivalence of the two groups regarding the target words knowledge.

Procedure

Two vocabulary lessons from the curriculum of Vocabulary Building (1) were selected. The first lesson was about Doctors and Hospitals as seen in the figure 1 below:

Doctors and Hospitals

Medical staff and patients

1 Match each person on the right with a definition on the left.

(a) an ordinary doctor — patient
(b) someone who looks after sick people in hospital — surgeon
(c) person who helps people with mental problems — out-patient
(d) sick person receiving treatment — in-patient
(e) sick person who has to stay in hospital — medical student
(f) sick person who has to visit hospital regularly for treatment — casualty
(g) someone who operates on sick people — psychiatrist
(h) person badly injured in an accident, fire, war — nurse
(i) person who helps at the birth of a baby — general practitioner
(j) person who studies to be a doctor — specialist
(k) person who specializes in one area of medical treatment — midwife

Doctors' surgeries and hospitals

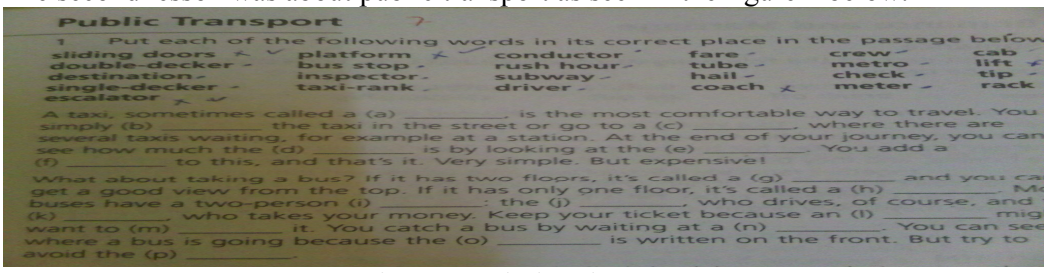
2 Put each of the following words in its correct place in the passage below.

thermometer ward prescription operation stethoscope pulse receptionist appointment chemist symptoms examine treatment waiting room temperature

When I go to the doctor, I tell the (a) _____ my name and take a seat in the (b) _____. My doctor is very busy so I have to make an (c) _____ before I go to see him. He asks me what's wrong with me. I tell him the (d) _____ of my illness, for example high temperature, difficulty in breathing, or pains, and then he will usually (e) _____ me. He'll listen to my heart with his (f) _____, he'll hold my wrist to feel my (g) _____, he'll take my (h) _____ with his (i) _____. The problem is usually something simple and he might give me a (j) _____ for some medicine, which I take to the (k) _____. Of course, if I needed more serious (l) _____ I'd have to go to hospital. There I'd be put in a bed in a (m) _____ with 19 or 20 other people. If there were something seriously wrong with me, I might need an (n) _____.

Fig 1: Vocabulary lesson 1

The second lesson was about public transport as seen in the figure 2 below:



Public Transport

1 Put each of the following words in its correct place in the passage below

sliding doors — platform — conductor — fare — crew — cab
double-decker — bus stop — rush hour — tube — metro — lift
destination — inspector — subway — hail — check — tip
single-decker — taxi-rank — driver — coach — meter — rack
escalator

A taxi, sometimes called a (a) _____, is the most comfortable way to travel. You simply (b) _____ the taxi in the street or go to a (c) _____, where there are several taxis waiting, for example at a station. At the end of your journey, you can see how much the (d) _____ is by looking at the (e) _____. You add a (f) _____ to this, and that's it. Very simple. But expensive!

What about taking a bus? If it has two floors, it's called a (g) _____ and you can get a good view from the top. If it has only one floor, it's called a (h) _____. Most buses have a two-person (i) _____: the (j) _____, who drives, of course, and the (k) _____, who takes your money. Keep your ticket because an (l) _____ might want to (m) _____ it. You catch a bus by waiting at a (n) _____. You can see where a bus is going because the (o) _____ is written on the front. But try to avoid the (p) _____.

Fig 2: Vocabulary lesson 2

Each lesson includes 25 words that learners are expected to learn and practice through filling gaps in a story-like reading passage or matching words with their definitions.

Procedure in the CALL classroom

Students, in the CALL classroom, were taught these words through using computers and Internet. The researchers designed each lesson by using PowerPoint. Each slide contains a word with its definition in English supported with pictures, as shown in the following Fig 3:

Fig 3: Sample of PowerPoint design for the target L2 words

When a teacher explains any words, students hear the pronunciation from the online dictionary where a native speaker sound pronounces the word. However, learners were able to use the online dictionary at any time during the classes their computers were connected with the Internet.

After explaining the lesson, learners were introduced into an activity, shown in Figure 3 , to practise these words through filling gaps by selecting a word from the dropdown list of words. The researcher designed this activity with the educational software Hot-Potatoes, as shown in figure 4 below:

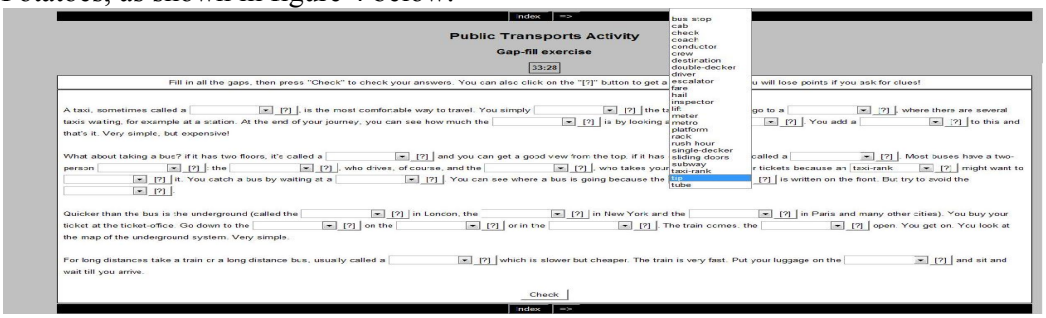


Fig 4: Acitivity design with Hot Potatoes

The learners can get a clue to the answer by pressing on the button as shown in the figure 5:

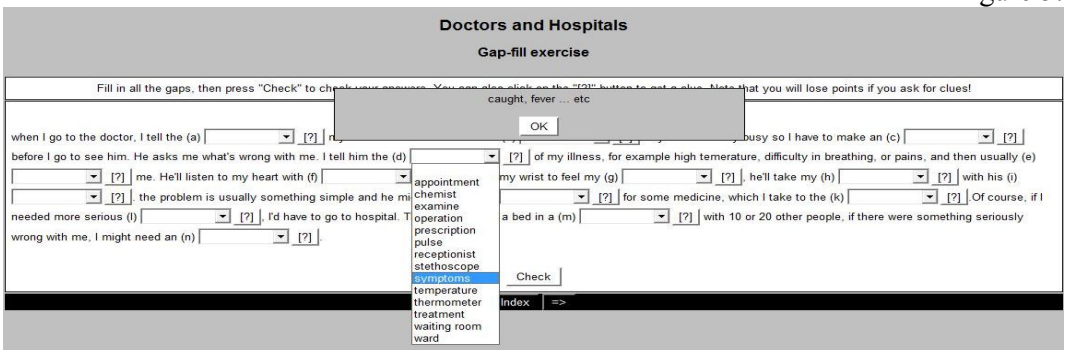


Fig 5: Sample of clues for answer symptoms in the activity

The clue for the answer: ‘symptoms’ were ‘caught, fever … etc’. These clues were put in to help the learner recognise the proper word. In case a student wants to know to percentage of correct answers, it can be obtained by pressing on the button ‘Check’ at the end as shown in the figure 6 below:

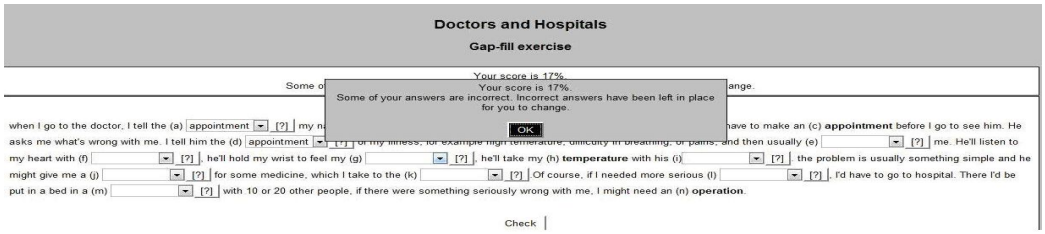


Fig 6: percentage of correct answers

Also, the student was able to use online dictionaries or any strategy to complete the task with a limited time of 35 minutes.

Procedure in the traditional classroom

A similar procedure for the tasks was followed with the traditional group, but with the traditional methods of teaching and learning – pen, paper dictionary, textbook and whiteboard. After each lesson, the participants, in each group, were introduced into an immediate post-test related to the lesson. After two weeks, the learners were introduced to the delayed post-test. Both immediate and delayed post tests were designed similar to the pre-test.

Findings and discussion

Immediate post tests

After the lessons, each group was given an immediate post-test as mentioned earlier. This was to make comparisons with their achievements in the pre-test to see which learning classroom enhanced their vocabulary learning more. The mean scores of the immediate post test for the CALL group are presented in the table 2:

Table 2: mean score of immediate post test for CALL group

	N	M	SD
Immediate post test for CALL group	31	79.32	4.39

As can be seen above, there was an improvement in their achievements compared to their achievements in the pre-test (M=51.38). To see whether or not the difference was significant, the paired sample test was run as presented in the following table:

Table 2: Paired sample test for the difference between pre and immediate test for CALL group

		M	SD	SE	95% Confidence Interval of the Difference		t	df	sig
Paired 1	Pretest-immediate post test	-2.79	4.91	.882	Lower -29.73-	Upper -26.13-	-31.66-	30	.000

It is clear that the difference between the two achievements was statistically significant. With regard to the delayed post-test, the table 3 shows the CALL group' mean score achieved in the delayed post-test:

Table 3: Mean score of delayed post test for CALL group

	N	M	SD
Delayed post test for CALL	31	70.22	4.58

group			

It is obvious that also their achievement in the delayed post-test was greater than the pre-test. The table 4 shows the paired sample test result of the difference:

Table 4: Paired sample test for the difference between pre and delayed test for CALL group

		M	SD	SE	95% Confidence Interval of the Difference		t	df	sig
Paired 1	Pretest-delayed post test	-1.88	4.89	.880	Lower	Upper	-2.14	30	**.000**
					-2.06	-1.70			

Also, the difference between the two achievements test was statistically significant (p=.000). The mean scores of the immediate post- test for the traditional group are presented in table 5:

Table 5 : Mean score of immediate post test for traditional group

	N	M	SD
Immediate post test for Traditional group	36	63.44	4.48

As can be seen above, there was an improvement in their achievement compared to their achievement in the pre-test (M=50.97). To see whether or not the difference was significant the paired sample test was run as presented in table 6:

Table 6:Paired sample test for the difference between pre and immediate post test for traditional group

		M	SD	SE	95% Confidence Interval of the Difference		t	df	sig
Paired 1	Pretest-immediate post test	-1.24	4.42	7.37	Lower	Upper	-1.69	35	**.000**
					-1.39	-1.09			

It is clear that the difference between the two achievements was statistically significant. Table 7 shows the traditional group' mean score achieved in the delayed post-test:

Table 7: Mean score of immediate post test for traditional group

	N	M	SD
Delayed post test for traditional group	36	61	3.24

It is obvious that their achievement in the delayed post-test was greater than the pre-test. Table 8 shows the paired sample test result of the difference between pre and delayed post test score:

Table 8: Paired sample test for the difference between pre and delayed post test for traditional group

		M	SD	SD Error mean	95% Confidence Interval of the Difference		t	Df	sig
Paired	Pretest-	-	3.58	.598	Lower	Upper	-	35	**.000**

1	delayed post test	1.002			-11.24-	-8.81-	16.76-		

Also, the difference between the two achievement tests was statistically significant (p=.000). Both groups' level of vocabulary knowledge improved after the study in both post tests. But, it is clear that the CALL group achieved much higher scores than the traditional group. A non-parametric (Mann-Whitney) test was used to see whether or not the difference between the two scores in the immediate post test was significant as shown in table below:

Table 9: Mann-Whitney test result for the difference between the two groups' achievements in the immediate post test

	Immediate test
Mann-Whitney U	4.000
Wilcoxon W	670.000
Z	-6.975-
Asymp. Sig. (2-tailed)	**.000**
a. Grouping Variable: CALL and Traditional	

So, the difference was statistically significant at the .01 level. The effect size (E.S) was also calculated based on [27] method. The result showed that E.S was 3.53, which is considered very large. With regard to the difference between them in the delayed post tests, independent samples t test was run to seen if the difference was significant or not, as shown in table 10:

Table 10: T-test result for the difference between the two groups' achievement in the delayed post test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	1.960	.166	9.60	65	**.000**	9.225	.960	7.307	11.144
Equal variances not assumed			9.36	52.96	**.000**	9.225	.985	7.249	11.202

Also, the difference between the two achievements in the delayed post-test was significant (p= .000). The E.S was also calculated and the result showed that E.S= 2.33, which is considered as very large. These results indicated that the intervention (CALL multimedia) has had very large impact on the experimental group (CALL group). With regard to their attitudes, table 11 provides their answer to each question:

Table 11: Summary of learners' overall responses for the attitude questionnaire questions

No.	Questions	Answer
1	Have you ever used the internet and/or educational computer programs for learning English?	Negative
2	Have you felt bored during lessons at the lab?	Negative
3	Do you support the use of computers in learning other subjects?	Positive
4	Did you make use of the vocabulary lessons as part of CALL?	Positive
5	Were the explanations and examples clear?	Positive
6	Do you think that learning vocabulary through the use of technology is better than the traditional way of learning?	Positive
7	Do you think that language labs are important in schools?	Very Positive
8	Do you intend to search the Internet for websites for language learning or using computers for learning English in future?	Positive
9	Was the Hot Potatoes activity useful?	Very Positive
10	Was the explanation by the PowerPoint useful?	Very Positive

It is clear that learners have positive attitudes towards using CALL for vocabulary learning and supported the existence of computers in schools. Their responses were supported with the interview that held with five students of them. They all agreed on the importance of the availability of computers in schools for teaching and learning all subjects. They enjoyed this experience and reported that CALL multimedia helped them learning the target words, as it provided them with various sources and they were able to answer the exercise with using either online and offline dictionaries.

Discussion of findings

It is clear that CALL multimedia was very effective for learning vocabulary, and the learners' achievements in the CALL classroom outperformed the learners in the traditional classroom. Also, the differences between the achievements of the two groups in both post-tests were statistically significant and this answers the first research question, which leads us to reject the null hypothesis. This result agrees with many studies presented in section 2.4, which found that the learners' achievements in CALL classroom were better than the learners' in the traditional classroom. However, the traditional learning classroom also helped learners to learn these words, but it was not as efficient as the CALL multimedia classroom. This is clear in their achievements in the immediate and delayed post -tests. In addition, the CALL learners reported positive perceptions towards using CALL multimedia for vocabulary learning and strongly supported the existence of language laboratories in schools. Also, these results are consistent with many studies presented in section 2.4, which found similar perceptions with their participants towards CALL. This result answers the second research question.

Conclusion

The findings showed that both groups learned a significant number of the target words, but it is clear that CALL multimedia significantly supported learners better than the traditional methods of learning and teaching. This was clear in the differences of mean scores, achieved by both groups in the immediate and delayed post-tests, that were statistically significant at (.01 level). Also, this was supported with the effect size values. These values showed that the intervention has a very large impact on the experimental group (E.S= 3.53 and E.S=2.33). Also, the CALL groups reported that CALL multimedia is very effective for vocabulary learning and they enjoyed this experience.

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FREQUENCIES OF WORD SOLVING STRATEGY USE AND THEIR PERCEIVED HELPFULNESS IN CALL AND TRADITIONAL LEARNING CLASSROOMS

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Abstract

The aim of this study was to investigate the frequency of L2 learners' use of word-solving strategies and their perceived helpfulness in a CALL classroom when compared with learners' in a traditional classroom. The participants of the study were 67 Saudi male students taking in English in the first year of a BA course in Majmaah University, KSA. The participants were divided into two groups. The first group was from the Community College and represented the CALL group (n=31). The second group was from the Administrative Sciences and Humanities College and represented the traditional group (n=36). This study used a range of qualitative and quantitative data collection methods, including questionnaire and interview.

The findings of the study showed that both groups' overall use of word-solving strategies improved after the implementation of the study, but the CALL group used the word-solving strategies more effectively than the traditional group, and the difference between them was statistically significant. However, there was no difference between the two groups regarding the most and least frequently used strategies in the two learning environments. A '*dictionary consultation'* strategy was the most frequently used strategy, and this was also perceived as a very helpful strategy, while the '*skipping new word*' strategy was the least frequently used strategy and was also regarded as not being a helpful strategy by the two groups. The CALL group also perceived the '*ask classmate'* strategy as not being a helpful strategy. However, a significant correlation between the frequencies of the word solving strategies and their perceived helpfulness in the two learning classrooms was identified.

Keywords: Computer Assisted Language Learning, CALL, Word Solving Strategies, Vocabulary Learning Strategies.

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Introduction

A number of studies have investigated learners' vocabulary learning strategies in CALL learning environments (e.g. [1], [2], [3]) and they have all called for further research in this field. In Saudi Arabia, several studies were conducted to investigate the frequency of vocabulary learning strategy use, but these studies, to best of the researchers' knowledge, were undertaken in traditional learning environments, especially those focused on word solving strategies. Therefore, the present study aimed to investigate word solving strategy use together with learners' perceptions of its helpfulness, but in two different learning classrooms.

Literature Review

Definitions of language learning strategies

Word solving and word attack strategies are categorised under vocabulary learning strategies that are a part of language learning strategies [4]. Therefore, it is useful to first present the earlier definitions of language learning strategies. According to Al-Shuwairekh [5], there are several definitions of learning strategies, and these differences are probably because there is no agreed typology. The following table (Table 1) shows some of these definitions:

Table 1: Definitions of learning strategies

Writer	Definition
Bialystok [6]	Learning strategies are optional means for taking advantage of existing information, in order to improve competence in a second language.
Chamot [7]	Learning strategies are the techniques which a learner uses to facilitate learning.
Wenden [8]	Learning strategies are the behaviours that learners engage in to learn.
Willing [9]	Learning strategies are specific procedures for rehearsing, processing and gathering information
Davies [10]	Learning strategies are the mental or physical actions a learner employs for learning consciously or unconsciously.

Importance of language learning strategies

Language learning strategies are very useful for L2 learners in different ways. For instance, they encourage learners to be more responsible and to control their learning [11]. Learners can decide the best strategy to identify the meaning of the unknown words. [4] stated that these strategies can be used by learners of all language proficiencies.

There are two reasons why strategic use of language learning is significant [12]. "First, by examining the strategies used by second language learners during the language learning process, we gain insights into the metacognitive, cognitive, social, and affective processes involved in language learning. The second reason for supporting research into language learning strategies is that less successful language learners can be taught new strategies, thus helping them become better language learners" (p.112).

Categorisations of vocabulary learning strategies

Although vocabulary learning strategies are part of language learning strategies, Alseweed [13] stated that vocabulary learning strategies in L2 literature are categorised into three main categorisations. The following table (Table 2) shows these categorisations:

Table: categorisations of vocabulary learning strategies

Word solving/ attacking strategies category	Memorisation strategies category	Practising strategies categories
Appeal for assistance strategy Skip unknown word strategy Appeal for assistance from strategy	Note-taking strategy Repetition strategy Recalling strategy Elaboration strategy	Interaction with other in real or imaginary environments

The current study concentrates on investigating the word-solving strategies category. Accordingly, the following discussion focuses on this categorisation only.

Word solving strategies

Word solving strategies have various definitions [14]. The term word solving has been defined as 'discovery strategies' [15], for example when a L2 learner meets a new word he or she will use the following strategies [16]: guess the meaning from the context, seek help from someone, look it up in dictionary or skip it. Guessing [17] is "the use of both pragmatic and linguistic clues to guess the meaning of an unknown word". In order to guess the meaning of the new word, in written texts, the following elements should be available [13]: Text (unknown or new word) and Clues. However, [18] guessing the meaning of the unknown word depends on the contextual clues might not be possible when the text has a high proportion of difficult words. Additionally "guessing is apparently more difficult when comprehension of longer context is required", ([19] p.53).

The learner should have a background about the subject [13] in order to be able to guess the meaning of the unknown word. Without knowing at least 95% of the running words the learner would find it difficult to use the guessing strategy [20]. Therefore, the learner should look for another strategy to identify the meaning of the unknown word. [19] suggests consulting a dictionary in such a situation. Learners are inclined to use a dictionary despite them often using the guessing strategy [14], and this because they are either unable to guess or are not able to find clues. Also, learners can seek help from other people, such as teachers or classmates. In case none of the above strategies was helpful, learners are advised to skip the new word.

With some words, the skipping strategy is recommended [21]. However this strategy in not always considered [22] as one of the true vocabulary learning strategies as unknown words are not learned when they are skipped. As is may be the case that [23] any learner who uses this strategy does not want to attempt to learn new words.

Vocabulary learning strategy instruction

The term strategy instruction should be used instead of using strategy training [24]. Several researchers discussed the importance of training learners in how to use vocabulary learning strategies effectively, and it is important that [25] learners should be instructed on how to learn effectively in order to facilitate the process of learning.

This responsibility is on the teachers, as they train the learners " how to learn, how to remember, how to think and how to motivate themselves". There are many investigators who have explored the effect of training EFL learners on how to use strategies effectively. The effect of metacognitive and cognitive strategies instructions on EFL learners has been explored [26] and shown to improve a learner's strategic level of vocabulary learning. EFL learners' awareness of vocabulary learning strategies can also be improved through training them in how to use some of the vocabulary learning strategies [27].

Vocabulary learning strategies research methods

Learners' use vocabulary learning strategies has been investigated using a variety of methods. There is no specific technique that succeeds in this field [28]. However the main research methods for investigating language learning strategies are [29] observations, questionnaires, interviews and thinking-aloud approaches. In the current study, two methods were used, namely questionnaires and interviews.

Factors affecting the choice of the study

A range of factors affect the choice of the vocabulary learning strategies [30]. For instance, culture, age, level of proficiency and context could affect the choice of the strategies. Other factors that may affect the choice of the strategies, include [31] motivation, gender, language, and attitude. One of the most important factors that affect the choice of the strategies is the learning environment [32] [33]. It is also important to remember that the behaviour of a learner in one learning environment may not be similar to his/her behaviour in another learning environment [34]. So the learning context such as the classroom environment are also important to consider [35].

Previous studies on word solving strategies

This section reviews some of the key studies that explore the use of word solving strategies, especially in Saudi Arabia. It is worth mentioning that these studies only explored the frequencies of word solving strategy use. None have researched the perception of their helpfulness. Hosenfeld [23] explored the word solving strategies used by ESL learners. The participants were 40 students from Spain, Germany and France. They were divided into two groups according to their proficiency level (20 as low proficient level and 20 as high proficient level). The researcher used two research methods to collect the data, namely thinking-aloud and interviews. The results showed that the dictionary use strategy was the first choice for the low proficient learners, while guessing the meaning of the new word strategy was the first choice for the high level proficiency level students. This result confirms that the proficiency level is a factor that affects the choice of vocabulary learning strategies.

Alseweed [13] also examined the use of the word solving strategies by 22 ESL learners of Arabic origin in the UK. He classified them into two groups, according to their level of proficiency. Students who studied English for less than one year were the intermediate group, while learners who studied English for more than one year were the advanced group. He used a questionnaire to collect the needed data. The results showed that all participants have used the word solving strategies. The first choice was the dictionary using strategy, and the second choice was the guessing strategy. The third choice was the skip new word strategy. Alseweed [21] also later investigated the word solving strategies used by 19 L2 Arabic-speaking learners' at

university level, especially after training. Eight of the participants were highly proficient in English, and the other 11 learners were of a low proficiency. He found that the guessing strategy was the most frequently used strategy by the high proficiency group, while consulting a dictionary strategy was the most used one by low proficiency learners.
Alseweed [36] conducted a further study on word solving strategies. His participants were 39 Saudi students, who were studying English at university. A questionnaire was the main data collection method. The participants reported that dictionary use strategy was the most frequently used strategy among others, followed by the guessing from context strategy. The least used strategy was the skip new word strategy. As can be noted from the above studies, these strategies investigated only frequencies and none talked about how learners perceive the helpfulness of the used strategies. These studies also did not involve the use of technology in has Computer Assisted Language Learning (CALL) classrooms. This study therefore focused on these additional issues.

Research design, methods and procedure

Research Questions

The current study aimed to answer the following research questions:

8- Is there a statistically significant difference between the reported frequencies of word solving strategies used by learners in the CALL multimedia classrooms and learners in traditional classrooms?
9- Is there a statistically significant difference between the reported perceptions of the helpfulness of word solving strategies by the CALL multimedia and traditional learners?
10- What are the most, and least, frequently used word solving strategies in CALL multimedia classrooms, when compared with traditional classrooms?
11- What are the most, and least, helpful word solving strategies in CALL multimedia classrooms, when compared with traditional classrooms?
12- Does frequency of use with regards to word solving strategies significantly correlate with perceptions regarding its helpfulness in both CALL multimedia and traditional classrooms?

Hypotheses of the study

4- There is no significant difference (at the .050 level), between learners in the CALL multimedia and traditional classrooms with regards to the overall reported frequencies regarding the use of word solving strategies.
5- There is no significant difference (at the .050 level), between the overall perceptions regarding the helpfulness of word-solving strategies in the CALL multimedia and traditional classrooms.

Participants in the study

67 male Saudi students from Majmaah University, who were majoring in English in their first year of a BA degree. One class was chosen at random to be the experimental class, the other assigned to the control condition. The first group consisted of 31 students from Community College representing the experimental group (CALL group). The second group consisted of 36 students from Administrative Sciences and Humanities (Now Education) College representing the control group. Their average age was between 19-20 years old. Both groups had studied English for six years in

their previous educational stages. Both colleges were based in Majmaah City, KSA. Participants in both schools were taught the same modules and teaching plan.

Data collection techniques

The researchers used both questionnaires and interview techniques to collect the data. The pre-questionnaire consisted of 6 questions. The first question was about training in vocabulary learning strategies in their previous educational stages, and five questions were about their previous use of the word solving strategies. The researchers used the five point Likert-scale (from 'Always' to 'Not sure') to calculate their responses. This design of this kind of questionnaire is frequently used to investigate learner strategies (e.g. [13], [21], [14]).

Questionnaires are "a scientific tool, and therefore must be constructed with great care in line with the specific aims and objectives of the investigation" [37]. The main advantages of this approach are that it is [38] economical and easily arranged and managed. The key issue is whether the questionnaire structure might include answers that reflect the researcher's thinking rather than the respondents'.

Therefore, the content of the questionnaire should be carefully designed. In this study the validity of the questionnaire was assessed by consulting experts in this field before the experiment. The reliability of the questionnaire was also confirmed. The Cronbach's Alpha for the pre-questionnaire was .76, and for the post questionnaire was .703, which were acceptable. With regard to the interview, it was part of the students' attitudes towards using computer-assisted language learning (CALL) for language learning.

Pre-questionnaire result

The main aim of this questionnaire was to ensure that the participants were equivalent in, and aware of the word solving strategies use. With regard to the training of vocabulary learning strategies, the finding is shown in Table 3:

TABLE 3: VOCABULARY LEARNING STRATEGIES TRAINING IN THEIR PREVIOUS EDUCATIONAL STAGES

Answer	Frequency	Cumulative Percent
No	58	86.6%
Yes	9	13.4%
Total	67	100.0

It is clear that they had no specific training sessions before. This agrees with Al Qahtani's [14] findings. He found that his participants, similar to this study, were not trained in how to use vocabulary learning strategies in their previous educational stages. This result allowed the researcher to introduce learners to an instructional presentation about vocabulary learning strategies. The following table 4 shows the reported use of these strategies before implementing our study.

TABLE 4: DESCRIPTIVE STATISTICS OF STRATEGIES USE OF EACH GROUP

Strategy	Traditional Group		CALL group	
	Mean	SD	Mean	SD
Ask teacher	2.89	1.03	2.65	.877
Skipping	1.25	1.02	1.77	1.23

Guessing	3.14	.961	2.68	1.30
Dictionary use	1.81	1.14	2.00	1.23
Ask classmate	2.39	.994	2.23	1.28
Total	11.47	2.18	11.32	3.10

It is clear that both groups have used these strategies before. The mean of the CALL group was slightly lower than the traditional groups. To ensure that this difference is not statistically significant, an independent samples t –test was run, and the result showed that the difference was not significant (p=.82). This means that the groups were equivalent in their reported use of the strategies.

The setting of the study

The colleges of Community and Administrative Sciences and Humanities were the best colleges in Majmaah University. With regard to the former, it has two language laboratories that were equipped with computers connected to the Internet, though its teachers mainly depend on the traditional methods. So, this environment was suitable for representing the CALL group. The latter, there was no language laboratories in the English department, and teaching depended on traditional method of learning, such as pens, textbooks, whiteboards etc., so its students were the best to represent the control group.

Procedure of the study

Students in the first year of English are required to study a Vocabulary Building (1) module. This module aims at improving their vocabulary knowledge by studying weekly words related to specific topics, such as education, hospitals, transportation etc. Students have opportunities to practise these words in different types of exercises, such as filling-in-gaps, match and other similar tasks. So, the researchers and teachers of the module selected two lessons from the curriculum. One was about education and the other one was about hospitals and doctors. Students are expected to learn 25 words in each lesson. The researcher designed these two lessons with multimedia, and the exercises were designed with the computer programme “Hot Potatoes”. These were used with the experimental group.

In CALL class

After teaching the participants the new words, students were asked to complete a tack designed with educational software, and presented via computer, as shown in the Fig. 1 below:

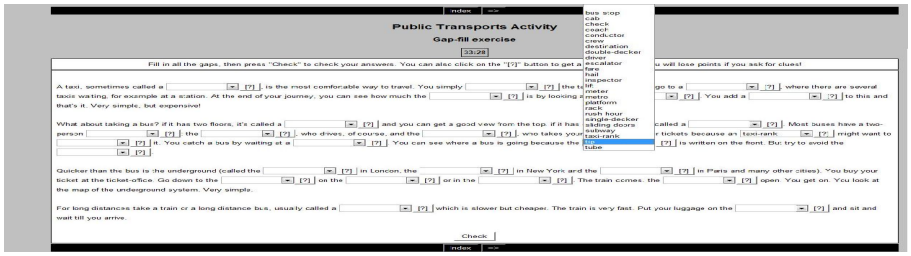

Fig 1: Activity designed with computer program

The nature of the exercise required the student to read a passage that contains gaps to be filled by choosing from a dropdown list. The list contains 25 target words related to the lesson being taught. The participants were encouraged to use any word solving strategy to identify the meaning of the unknown words. In case the student wanted to

get clues about the right answer, he could press on a button to get linguistic clues, such as a definition, synonyms etc., as shown in the Fig. 2 below:

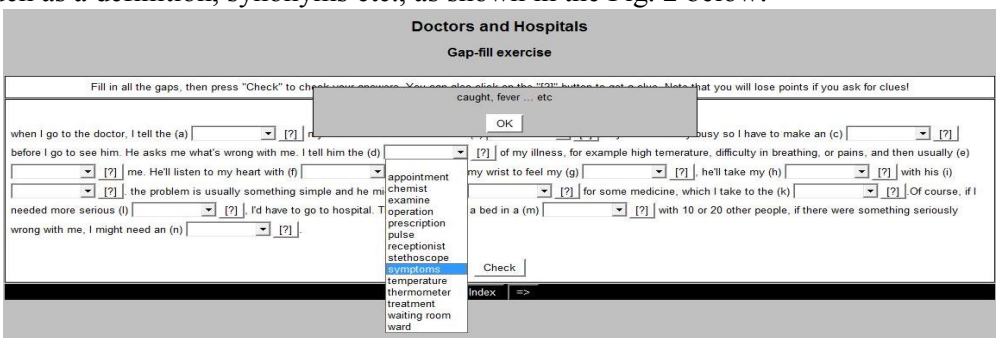

Fig 2: Clues example in CALL activity

The clues for the answer 'symptoms' were 'caught' and 'fever'. The students could also access online dictionaries to find out the meaning of the unknown words. By pressing on the icon Check, the learners got a percentage of the correct answers with possibility of altering any incorrect answers.

In the traditional class

The same procedure was applied with the learners in this classroom, but with traditional methods of learning and teaching. The students completed the same exercises, but with printed activities only. After two weeks of teaching, the participants, in both classrooms, were asked to complete the second version of the questionnaire about the frequencies of the word solving strategies and its perceived helpfulness.

Results

The learners' responses to the questionnaire questions were analysed using SPSS. The following table (Table 5) shows the mean scores of each strategy for each group and the overall result, along with the correlation between frequencies and perceptions:

Table 5: Analysis results of the students' responses to the questionnaire

Frequency of use rank order					Helpfulness perceptions rank order				
Strategy	CALL (N=31)		Traditional (N=36)		Strategy	CALL (N=31)		Traditional (N=36)	
	Mean	SD	Mean	SD		Mean	SD	Mean	SD
Dictionary use	3.84	5.2	3.50	.65	Dictionary use	4.94	.25	4.78	.42
Guessing	3.48	.62	3.17	.81	Guessing	4.42	.56	3.89	1.3
Teacher help	3.13	.56	2.94	.71	Teacher help	4.81	.40	4.28	.74
Classmate help	2.45	.76	2.33	.92	Skip new word	3.45	1.2	3.03	1.4
Skip new word	1.97	.75	1.83	1.0	Classmate help	3.23	1.5	3.03	1.5

Overall	14.87	13.72	Overall	20.80	19
Sig.	.049		Sig.	.048	
Correlation between frequencies and perceptions			In CALL class= .413, Sig=.021	In Traditional class= .481 Sig=.003	

Discussion of the findings

Overall frequency of use and perceptions of word solving strategy helpfulness

It is clear that the overall reported use of these strategies increased after the study for both groups, when compared to their overall use of the strategies before the study. This can be attributed to the usefulness of training presentation, or the participants were more motivated to apply the strategies. These interpretations agree with earlier [21] findings in this field. Interestingly, the overall reported use of the CALL group was greater than the traditional group's, and this result indicates that the CALL classroom, the focus of the current study, encouraged them to use these strategies more than the traditional classroom, and the difference was statistically significant ($p = .049$). This answers the first research question. With regard to the overall perception towards their helpfulness, the analysis also showed that the CALL group reported more use of the word solving strategies than the traditional group. Statistically, the difference between their perceptions was statistically significant ($p = .048$). This answers the second research question. These findings indicate that the learning environment played an important role regarding encouraging learners to make use of the learning strategies. So, the null hypotheses are rejected, and we should accept the alternative ones.

Each word solving strategy discussion

By looking to the mean score of each strategy, we note that the dictionary use strategy was used by the CALL group more than the traditional group, though both groups reported that this strategy was the most frequently used strategy, and was also the most helpful. Also, the means of this strategy indicate that both groups were high strategy users of this strategy, according to Oxford's [39] categorisation, which classifies the use of strategies into different ranks of use. (The means from 3.5 and above are ranked as high strategy users, from 3.49 to 2.5 as medium use of strategy and from 2.49 and below as low strategies user.) This result suggests that both groups referred to reliable sources for identifying the meaning of the unknown words, or that the participants consulted dictionaries to confirm their guesses of the meanings of unknown words. This finding is consistent with the studies reported above that found the dictionary using strategy was the most frequently used strategy by low proficient learners. Interestingly, it should be noted that the CALL group used this strategy more than the traditional group. In an interview with five students, the students stated that they preferred using an electronic dictionary, as it was easier for them to copy a word or sentence and paste it in the dictionary, which provided them with an instant translation. So, this encouraged them to use this strategy more. Also, they used this strategy on two different kinds of electronic dictionaries. They used offline dictionaries, such as Microsoft Word translator, to get the meaning of the unknown

word, as well as online dictionaries such as Google translator. But, in the traditional classroom, learners used only the paper dictionaries, as the researchers informed them before the implementation of the study that they will use only traditional methods of learning. The above result answers the first parts of the third and fourth research questions about the most frequent and helpful strategy.

With regard to the guessing strategy, it was as the second used strategy by both groups. This result is also consistent with studies' findings discussed above, which found that guessing strategy is the second choice for the low proficient learners. Both groups were medium users of this strategy. However, the CALL group used this strategy more than the traditional group. This can perhaps be attributed to the availability of the clues which helped learners to identify the meaning of some new words. Also, both groups perceived this strategy to be a helpful strategy. Regarding the seeking of help from someone, such as the teacher or a classmate in this study, the findings showed that our participants were inclined to seek help from their teacher more than seeking help from their classmates. This also indicates that our learners perhaps wanted to get help from reliable sources. The ‘ask teacher’ strategy was the third most reported strategy by both groups. This is perhaps also why both groups perceived it as not being a helpful strategy. However, it also is clear that both groups were not inclined to use the skip new word strategy. They were low strategy users and regard this strategy as the least helpful. These perceptions are good indications that our participants wanted to learn the unknown words they met. This finding is also consistent with previous studies that found that the skip new word strategy was the least used strategy among others. Both groups reported that this strategy was the least helpful, but the traditional group also reported that besides this strategy, the ask classmate strategy was also unhelpful. The above results answer the second part of the third and fourth research questions. Also, the findings showed that there were correlations between frequencies and perceptions in both learning environments and this result answers the last research question.

Implications for further research

Further studies on both male and female learners' vocabulary learning strategies, especially word solving strategies, in a CALL learning environment are required. Also, proficiency level of language was a factor affecting the learner's choice of language learning strategies. Therefore, it should be considered in further research in CALL learning environments. This study relied on identifying differences in reported use of strategies. Future research might investigate the reliability of learners’ perceptions of use.

Conclusion

The findings of the study indicate that the learning environment affects learner's reported use of vocabulary learning strategies. The learners in CALL classrooms reported using the word solving strategies more frequently than those learning in traditional classrooms. The increase was attributed to the different opportunities for learning that the CALL classroom provided. Learners in the traditional classroom also used these strategies but reported less frequent use. The findings indicate that there was no difference between the two groups with regard to the overall order of preferences of using the strategies. Dictionary use was the first choice of the two groups, while the skip word strategy was the last choice.

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The effect of a CALL multimedia classroom on learners' Vocabulary achievements when compared to learners' in a Traditional classroom and their attitudes towards CALL

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Introduction

This study investigated the effect of a CALL multimedia classroom on L2 learners' vocabulary learning compared with a traditional learning classroom environment and their attitudes towards using CALL multimedia. Previous research on Computer Assisted Language Learning (CALL) and multimedia indicate that this method is effective for vocabulary learning and teaching.

Rieners, et al. (2005) indicated that the integration of technology into the classroom was very effective and positively affected the students' motivation and interest in learning. This integration helps to increase classroom interaction as well [16] and "learner's motivation is the crucial factor for acquiring a foreign language, and new technology greatly contributes to both English language teaching and learning". Luac, et al. (2006:120)

Research Questions

1- Are there statistically significant differences between the achievements of learners in the CALL multimedia classrooms and those in the traditional classrooms in the immediate and delayed post-tests?

2- What attitudes do learners in CALL multimedia classrooms have towards using CALL multimedia for vocabulary learning?

Research Method

The current study adopted the quasi-experimental method. As it was not been possible to assign learners randomly into two groups.

Research Design

This study used Pretest/Posttest Nonequivalent Control Design

Data Collect methods

1- Pretests
2-Postests
3- Questionnaire

Participants

67 Saudi male students, from Majmaah University in Saudi Arabia, participated in this study. They were studying in English department at the first year of BA. One class was chosen at random to be the experimental class, the other assigned to the control condition. The first group consisted of 31 learners from Community College representing the experimental group (CALL group). The second group consisted of 36 students from Administrative Sciences and Humanities (currently education) College, representing the control group. Both groups were homogenous as they all have studied English for six years in their previous educational stages. Their average age is between 19-20 years old.

Pre-test

Table 1: Descriptive statistics of pre-tests result

Test	Group	N	M	SD	Sig
Pre-test	CALL	31	51.38	1.47	.22
	Traditional	36	50.97	1.20	

As shown in the table above, both groups were equivalent in their knowledge of the target L2 words.

Lessons design

Figures 1 and 2 show examples of the lessons in CALL class

- Fig 1

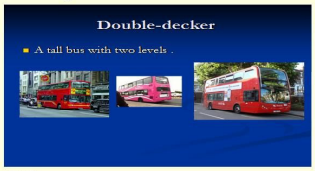
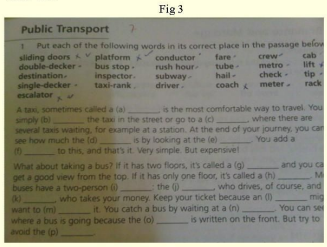


Fig 2

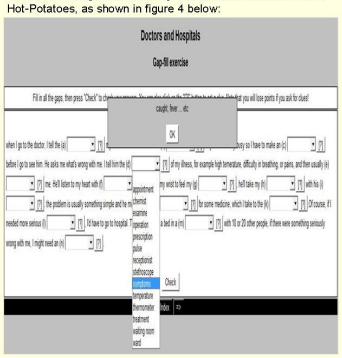
The following figure 3 shows the lesson in the traditional classroom

Fig 3



Procedure

Students, in the CALL classroom, were taught these words through using computers and Internet. The researchers designed each lesson by using PowerPoint. Each slide contains a word with its definition in English supported with pictures, as shown in the following Fig 1. When a teacher explains any words, students hear the pronunciation from the online dictionary where a native speaker sound pronounces the word. However, learners were able to use the online dictionary at any time during the classes their computers were connected with the Internet. After explaining the lesson, learners were introduced into an activity, shown in Figure 3 , to practise these words through filling gaps by selecting a word from the dropdown list of words. The researcher designed this activity with the educational software Hot-Potatoes, as shown in figure 4 below:



The findings of the study

1- Immediate post test for CALL group

Table 2: mean score of immediate post test for CALL group

	N	M	SD
Immediate post test for CALL group	31	79.32	4.39

As shown above, the CALL group's level of vocabulary knowledge was improved compared to the pretest and the difference was statistically significant (p=.000).

2- Immediate post-test for the Traditional group

	N	M	SD
Immediate post test for Traditional group	36	63.44	4.48

Also, the traditional group's level of target L2 words was improved as shown in the table above. The difference between the pre- and immediate post test was statistically significant.

So, Both groups' level of vocabulary knowledge was improved after the study in the immediate post test, but it is clear that the CALL group outperformed the traditional group. Therefore, Mann-Whitney test was run to see whether the difference was statistically significant or not as shown in the table below:

	Immediate test
Mann-Whitney U	4.000
Wilcoxon W	670.000
Z	-6.975-
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: CALL and Traditional

It is clear that the difference in the immediate post test was statistically significant.

3- Delayed post test for the CALL group

	N	M	SD
Delayed post test for CALL group	31	70.22	4.58

The CALL group achievement in the delayed post test was also higher than their achievement in the pretest.

4- Delayed post test for the traditional group

	N	M	SD
Delayed post test for traditional group	36	61	3.24

Also, the traditional group's achievement in the delayed post test was greater than their achievement in the pretest.

But it is clear that the CALL group's achievement was greater than the traditional group's. Therefore, Independent Samples t-test was run to see whether or not the difference between the means was statistically significant shown in the table below:

	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
Equal variances assumed	1.960	.166	9.68	65	.000	9.225	.960	7.307	11.144
Equal variances not assumed			9.36	52.9	.000	9.225	.985	7.249	11.202

The difference was statistically significant. Also, the CALL group reported positive attitudes towards using CALL for vocabulary learning.

Conclusion

This study proved that CALL multimedia is very effective for vocabulary learning. Also, it showed that learners have positive attitudes towards CALL.

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