UNIVERSIDAD ICESI

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LEARNING?

MASTER'S REPORT

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MASTER OF ARTS IN THE TEACHING OF ENGLISH AS A FOREIGN LANGUAGE

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ABSTRACT

This study set out to find out how working memory could contribute to retain and to apply vocabulary studied in English lessons through the implementation of a set of strategies oriented to boost this capacity in the learners. 50 English beginner learners from a University in Pasto, Colombia were involved in the study; 28 were part of the experimental group who received direct working memory intervention and 22 who belonged to the control group receiving no treatment at all. The experimental group developed the strategies alongside with the teacher's guidance during 12 weeks. Then, the learners' performance was analyzed and interpreted. It was discovered that most learners benefitted from the working memory intervention and showed gradual progress in the retention and retrieval of the words studied in the lessons, thus being able to engage more easily in communicative tasks in the classrooms. The strategies that involved visual aids were more effective than those asking students to process aural information. Results demonstrate that appropriate working memory training can contribute to enhance learners' L2 vocabulary retention through well-thought-out strategies designed to meet that objective. Further studies are suggested to implement listening tasks that stimulate the phonological loop as an alternative to enhance learners' retention through aural L2 input. Likewise, it is advised to engage apathetic learners by incorporating tasks oriented to their learning styles and thus helping them retain L2 vocabulary more effectively.

Keywords: working memory, language retention, memory strategies, English as a foreign language or second language

INTRODUCTION

The role of memory in language teaching and learning seems to have been ignored due to the advent of communicative approaches in the last few decades. The teaching focus has been on increasing students' interaction and on exposing them to big amounts of L2 input without giving to much attention to the relevance memory has in language learning.

Vocabulary is an essential component in language learning since it enables students to get involved in all kinds of classroom tasks. Speaking, listening, reading and writing activities rely, to a great extent, on the language inventory that learners have for successful performance and outcomes, and more importantly, for eventual meaningful learning. Therefore, memory plays a pivotal role since it is responsible to assist learners store information and retrieve it when further required.

Consequently, working memory, particularly, is an essential component in L2 learning because it allows holding information while mentally engaged in other relevant activities. This capacity is crucial to many classroom activities such as vocabulary tasks. Many of those activities entail quite considerable burden on working memory and often require students to hold in mind some information that may overload their working memory. Here, the struggle begins for those students with working memory deficits, who often lose from working memory the crucial information needed to successfully complete academic tasks. Thus, language teachers ought to create adequate conditions in which learning can occur and in which those memory deficits can be minimized by incorporating several instruments and techniques in order to assist learners in the process of learning vocabulary effectively.

1. RESEARCH PROBLEM

1.1 BACKGROUND OF THE STUDY

This study was conducted at a public University in Pasto, Colombia. The language center has 60 teachers including full time, part time and hourly teachers and the participants were students part of the language courses offered to different undergraduate programs such as Medicine, Engineering, Arts, International Trade, Psychology, Law and Philosophy among others. Their ages range between 18 and 24 years and they usually come from households with a medium socio-economic stratum. The learners' academic background is the product of a 6-year formation in regional public and private high schools whose intention is to create students capable of pursuing superior education objectives.

As part of the academic formation, they are required to take six English courses to be certified in an A2 English proficiency level. Each course lasts 5 months with a weekly intensity of 5 hours. The procedure employed to place students into a specific level is the score in Saber 11 Test. However, there is an institutional project of administering an English placement test to know with certainty their English language proficiency, which hopefully will be implemented, at some point, in the next semesters.

Moreover, it is the University 's desire to prepare the students to interact communicatively in a foreign language, in this case English, with the globalized world and to meet the current professional expectations and demands. In order to comply with this institutional intention, the learning of vocabulary in the L2 is seen as an essential component that needs a special attention in the lessons because it is a vital basis for elaborating successful communication processes in academic and non-academic situations.

1.2 PROBLEMATIC SITUATION

After observing and interpreting certain ways in which the learners selected for this research study act during lessons, they might possibly present typical indicators of weak working memory capacity that can be addressed.

To begin with, learning a second language is an area visibly susceptible to working memory limitations. It is common for teachers, and particularly in the participant of this study, to present certain vocabulary or grammar components without seeing students make much progress or forget lessons easily overnight. There is a troublesome aspect that has possibly prevented them from learning the key vocabulary effectively according to their level of proficiency. First, they have difficulties with tasks that require storage and processing of information e.g. remembering words and put them into practice. Also, they tend to easily get distracted and inattentive before and during classroom tasks. Being unable to follow a series of instructions needed to perform class activities is also a constant issue since they keep asking for repetitions of thorough steps and even for simple written instructions. Likewise, reading and listening comprehension presents several difficulties to learners since they are not able to retain information that they have previously read. It can sometimes be observed that learners revise for exams attempting to cram language contents and the only outcome is low marks in achievement tests and classroom tasks. The most notorious and salient characteristic has been the difficulty to retrieve L2 vocabulary that has been previously introduced in the two groups that took part of this study; therefore, they are not able to use it properly in communicative situations in the class. That fact makes learners begin to resent English language learning feeling frustrated because they regard themselves as unsuccessful L2 students.

1.3 RESEARCH QUESTION

The problematic situation led to the formulation of the following research question:

How can working memory strategies contribute to retain and apply vocabulary studied in English lessons?

2. OBJECTIVES

2.1 GENERAL OBJECTIVE

To determine if boosting students' working memory improves their memorization and use of vocabulary studied in English lessons

2.2 SPECIFIC OBJECTIVES

1. To identify how working memory contributes to enhance L2 students' vocabulary.

2. To apply techniques intended to boost students working memory capacity.

3. To engage learners in communicative tasks based on vocabulary boosted by working memory training.

3. JUSTIFICATION

It is common for most language teachers to realize that some pupils have more difficulties than others to memorize, understand grammar rules and vocabulary even though they are under the same learning conditions. This situation is echoed in the difficulties to engage themselves in effective communication in the classroom. Learners' low or lacking progress is of pivotal concern, not only for them, but also for teachers as facilitators of learning.

Research conducted in SLA and cognitive psychology (Atkinson, & Shiffrin, 1968; Baddeley, 1992, 2000; St. Clair-Thompson & Holmes, 2008) has demonstrated that language learning is reliant on working memory. Over the years, it has been proven that working memory capacity can vary from person to person (Daneman & Carpenter, 1980; Shenfield, 2012) and individuals with working memory difficulties are able to maintain less information mentally, resulting in the inability to complete certain cognitive tasks that would ultimately lead to meaningful learning. However, it has also been seen that the use of strategies that help students train their working memory is an effective way to overcome this limitation (Gathercole & Alloway, 2008; Holmes, 2012). Bearing these aspects in mind, this study is aimed to use boosting working memory strategies to help English as a Foreign Language - EFL students enhance their vocabulary learning in language-related tasks.

The importance of this study refers to the lack of the necessary vocabulary in language learning as a common scenario in daily pedagogical practice, therefore, it is a good opportunity to explore the effect of such strategies and, if they prove to be effective, use them subsequently as a means to compensate for students' working memory limitations to improve learning and possibly prevent them from being frustrated and even dropping out. Also, this study is worth carrying out to promote a higher degree of involvement on the part of teachers in students' learning progress,

as they may require not only the knowledge the teacher can provide, but also ways to take that knowledge in and make it meaningful.

Some strategies proposed by Gathercole and Alloway (2007) have proven to be effective in enhancing students' working memory. These strategies were the key elements applied in the population selected for the current study whose objective is to determine whether the use of vocabulary might be enhanced through the learners' working memory.

4. THEORETICAL FRAMEWORK

The awareness of what we know depends upon our ability to remember what has been learned. Thus, learning is defined as that direct interaction resulting in a change in behavior, interpretation, autonomy or creativity that results from experience (Cell, 1984 as cited in Jarvis, 2012). But this learned information must be stored within the individual in order to be retrieved afterwards. This process of storage is memory, the mechanism that allows the individual to retain and retrieve information over time.

Atkinson and Shiffrin (1968) suggested that short-term memory operates as the entry by which information gets to long-term memory. So, the function of short-term memory is to control, rehearse and manipulate the information that gets to long-term memory, i.e. all the information that would eventually be stored in long-term memory, should necessarily go through short-term memory first (Atkinson & Shiffrin, 1968).

Likewise, Baddeley and Hitch (1974) conducted a behavioral experiment with neurologically healthy people demonstrating that if there was only one short-term memory store available, when the subjects completed a reasoning task while memorizing a series of digits, their performance would plummet and be defective. Yet, that was not the case, the participants took more time to complete the task but made no mistakes. This evidence led to put forward a model of short-term storage, whose bond with long-term storage comprises a more active function than just storing. It was then that the concept of working memory was progressively used as it was considered a useful workplace wherein complex cognitive activities engage.

4.1 WORKING MEMORY

Working memory is of crucial concern with regards to human cognition. Simple cognitive tasks, such as reading, calculating, solving problems, often involve several steps with

intermediate results that should be stored momentarily in mind in order to carry out the task

successfully (Bailer, Braga, & Souza, 2013).

Churchill and Eton (2002) define working memory as a complement to long-term memory

that allows for short-term activation of information while permitting the manipulation of the

information in question.

Baddeley (2003) asserts that working memory implicates the temporary storage and

control of information necessary for a wide range of complex cognitive activities. In the same

way, Shenfield (2012) proposes a very understandable definition of working memory when

affirming that it is defined as that faculty to mentally maintain previously learned or newly

acquired information for a short period of time and to use it in problem solving and task

completion. Likewise, Ellis (2015) posits that learners with higher working memory internalize

feedback in a better way and respond to it by modifying their output and by relating information

in working-term memory to that held in long-term memory.

This concept of working memory is what constitutes the Baddeley & Hitch model (1974),

which has had great influence in the field of cognitive psychology in its endeavor to try to

understand the processes immersed in the memory system. The model presented by Baddeley and

Hitch (1974) initially consisted of three components: two short-term stores and a control system,

explained as follows:

4.1.1 Phonological Loop.

The phonological loop is described as a storage system for speech-based information,

responsible for storing, manipulating and retaining phonological materials over a short time

(Alharbi, 2015). Besides, it is accountable for phonological short-term memory, i.e. the capacity

to remember minimal quantities of heard information temporarily. It is divided into two further

subcomponents:

1. The phonological store: it holds speech material for brief intervals. It is somewhat passive because it just maintains the information, which fades away rapidly. In fact, only two seconds of speech-related material can be seized.

2. The articulatory rehearsal mechanism: it is used to recite the information in the phonological store. Baddeley and Hitch (1974) describe it as a tape recorder with duration of two seconds. This process is named articulatory rehearsal and it is used to increase the capacity of phonological short-term memory and to prevent the information from being lost by refreshing it (Baddeley & Hitch, 1974).

4.1.2 The Visuospatial Sketchpad.

This is the storage system responsible for briefly holding visual and spatial material and it can be employed when thinking, remembering and processing tasks. Therefore, it is responsible for supporting visuospatial short-term memory temporarily. Within the visuospatial sketchpad, it is possible to remember two aspects: *what*, that is, the visual features of an object and the *where*, meaning the place where the object is located in space. Generally, these two types of mechanisms can be denoted as visual versus spatial short-term memory (Baddeley & Hitch, 1974).

4.1.3 The Central Executive.

This component is responsible for determining when and where information is consigned, either in the phonological loop for verbal information or the visuospatial sketchpad for visual. It offers an instrument by which information held in the buffers can be inspected, transformed, and cognitively operated (Baddeley, 2000). Executive processes are probably the ones that determine individual differences in working memory capacity (Daneman & Carpenter, 1980), which has

proven to be a strong predictor of successful performance in many complex cognitive abilities, ranging from reading comprehension to learning electronics (Daneman & Merikle, 1996).

Although the original working memory model consisting of three major components was very successful in experimental research, it was criticized for the lack of evidence explaining the effects of long-term knowledge on working memory. Accordingly, a fourth constituent to the model was introduced, the episodic buffer representing the major modification to the initial model (Baddeley, 2000).

4.1.4 Episodic Buffer.

Baddeley's episodic buffer (2007) is a new piece, labeled as a multimodal temporary store. Not only does it store information in one modality (e.g. auditory, visual or spatial), but integrates information from many different modalities. In short, the episodic buffer incorporates information from several sources into a meaningful unit or episode.

Szmalec, Brysbaert and Duyck (2012) state that first and second language acquisition are probably the best example of the binding executed by the episodic buffer. As Baddeley (2007) explains, this element offers extra storage capacity and approaches long-term knowledge about language, grammar and syntax to boost phonological short-term memory in the phonological loop. It connects information from different sources and merges new material with information already stored in long-term memory to generate unified and coherent units.

The working memory model

Taken from: https://upload.wikimedia.org/wikipedia/commons/thumb/a/ae/Working-memory-en.svg/2000px-Working-memory-en.svg.png
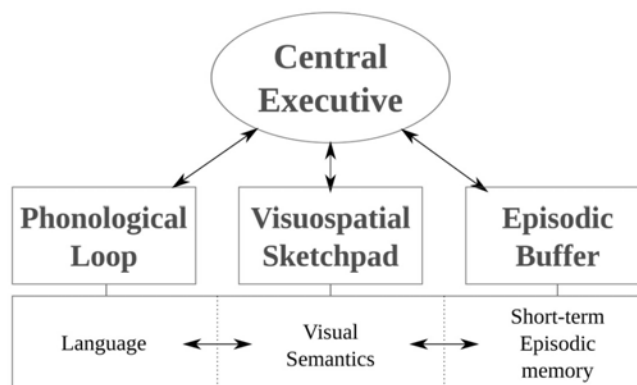
4.2 VOCABULARY ACQUISITION IN SECOND LANGUAGE

It is undeniable that vocabulary is fundamental to language so the language learner is able to perform well in communicative tasks inside the English classroom, and more importantly in real life situations. Also, a great number of learners can, to some extent, be unable to engage and participate actively in communicative classroom tasks if their L2 repertoire is limited, and the purpose of developing communicative competence is seriously affected. Vocabulary has been deemed as a primary feature in second language learning; actually, it is believed to be as important as the main skills of reading, writing, listening, and speaking (Mehring, 2005). It is the teacher's duty to facilitate vocabulary learning and equip learners with techniques to remember words more effectively.

Mehring (2005) asserts that language acquisition requires discipline and daily constancy, working on unknown words in order for learners to remember and situate them into their long-term memory. This must also be accompanied with authentic tasks that involve the four language skills to effectively approach and stimulate language retention in as natural contexts as possible.

Likewise, Yongqi Gu (2003 as cited in Mehring, 2005) affirms that the acquisition of language vocabulary is an activity that is learner-centered assisted by the effectiveness of the learner's strategies towards new vocabulary acquisition and their motivation can be enhanced in a cooperative milieu that allows peer learning. Mehring (2005) claims that students need to be given enough chances to use the new vocabulary during the course because it can help them transfer to their long-term memory.

Thus, vocabulary must be presented in appropriate situations, providing precise opportunities to use it and that way maximizing learners' repertoire, because as Al-Zahrani (2011) asserts, vocabulary knowledge is closely related to academic success since learners who have a large vocabulary are able to understand new ideas and concepts more quickly and deeply than those with a limited vocabulary.

4.3 STRATEGIES THAT BOOST WORKING MEMORY CAPACITY

Researchers have been concerned with identifying cognitive mechanisms that are important in supporting learning and development during childhood. Such mechanisms comprise short-term and working memory, systems responsible for maintaining information over brief periods of time (St-Clair - Thompson & Holmes, 2008).

Given the growing evidence on the contribution of working memory in the cognitive process and learning, awareness of the negative consequences of limited working memory has also gained importance, and so has a demand for strategies tackling the issue. The following are some strategies originally proposed to assist children with learning difficulties but may be well applied with older audiences in different cognitive domains (Gathercole & Alloway, 2007; Holmes, 2012).

1. Monitoring the student

According to Gathercole and Alloway (2007), when dealing with working memory and its training, it is vital to look for warning signs of memory overload. Language practitioners may have to ask the student for detail of what s/he is planning to do next and estimate the working memory demands of the task. Therefore, learners with working memory deficits might require more guidance from the teachers, as activities turn more demanding, have unfamiliar content and need more mental work.

2. Reduce the memory load

One appropriate step is to break tasks and instructions down into smaller steps. If possible, assign one task at a time by reducing the amount of material the student can process. Also, teachers must keep directions brief and straightforward and repeat them for the learners if they require so (Gathercole & Alloway, 2007).

Gathercole and Alloway (2007) also proposed to simplify the amount of mental processing required by writing key words for each verbal direction to void working memory overload. Similarly, it can be helpful to provide information in varied channels by speaking, showing and by creating opportunities to physically work with it.

3. Repeat and review

Gathercole and Alloway (2007) claimed that repeating and reviewing is important and this can be done in various manners. For instance, by using visual prompts of the steps and by providing opportunities to repeat the task. Finally, having students practice class contents in short sessions during the day rather than in one long session is also suggested

4. Advance organizers

Using organizers and teaching students how to use them can be beneficial. For example,

KWL (what I know, what I want to know and what I learned) is a graphic aid that helps to focus on what to learn. This organizer triggers prior knowledge, helps generate questions to explore and then assists students to connect new knowledge to what they already know (Gathercole & Alloway, 2007).

5. Encourage the use of memory aids

According to Gathercole and Alloway (2007), it is vital to use visual posters, create posters of frequently used words. Also, giving instructions through written material such as handouts, whiteboard or slices of paper. Similarly, providing an outline and encouraging the use of checklists for multi-step tasks are essential and simple step to make learners aware of the aids they can utilize.

6. Develop the learner's use of memory-relieving strategies

Gathercole and Alloway (2007) state that individuals with working memory deficits know that important information is being forgotten and regularly do not know how to react in those circumstances. An important role for the teacher is to encourage learners to foster strategies for minimizing memory problems.

7. Pause, paraphrase, summarize and allow time.

Gathercole and Alloway (2007) indicate that it is always necessary to stop the lesson and ask students for a quick summary followed by quick notes on the board. Also, students will probably remember more if they hear their own voices or a classmate's voice. It is pertinent to allow time to process the information and give students moderate time to retrieve it (Gathercole & Alloway, 2007).

8. Color code

According to Gathercole and Alloway (2007), not only will visual learners benefit from the variety of color you may bring into the classroom and to include in your teaching strategies and tasks, but also most of your students will find it supportive and engaging at any point in the lesson. Therefore, physical coding with consistent colors can help students memorize information more effectively. Besides, teachers can try to color coding for new concepts and when teaching sentence structure i.e. nouns can be red, verbs can be green and adjectives blue. Spelling can also be taught through color-coding by highlighting difficult parts of new words and by organizing new words in categories and assign them a particular color.

9. Key words

Gathercole and Alloway (2007) claim it is appropriate to train learners to grasp specific important words in a listening task. Those learners with working memory deficits recurrently have difficulties retrieving words and present the issued called tip of the tongue. It is observed that they need more time to answer questions and providing them with cues to help them focus on the correct words can be advisable.

10. Reinforce learning preferences

Modern software programs can be an effective alternative to rehearse and interiorize information from the lessons by encouraging students to define what best worked for them. Socrative and Kahoot are two important electronic tools to achieve this objective (Gathercole & Alloway (2007).

These strategies proposed by Gathercole and Alloway (2007) and complemented by Holmes (2012) have been tested by teachers, who have declared that the suggested activities are practical to implement within the existing curricula and that their application has enabled them to

understand that many task failures are the result of forgetting. Learners, on the other hand, have benefited from working with their own memory limits, presenting advances in performance when the techniques are applied and develop properly. (Elliot, Gathercole, Alloway, Holmes & Kirkwood, 2010).

According to Gathercole and Alloway (2007) and Holmes (2012), it is worth considering the implementation of one strategy at a time and tell students when, where, why and how to use the strategy for a greater impact on their learning process.

4.4 WORKING MEMORY AND SLA

After reviewing the structure and components of working memory and analyzing the literature on the matter, it can be said that there exists convincing evidence supporting the role of working memory in first and second language acquisition. As Baddeley (2007) puts it, working memory mechanisms are vital in linking new information about a language to knowledge which has been previously stored in long-term memory.

Research findings (Baddeley, Papagno, & Vallar, 1988) suggest that variables that affect the phonological loop performance can alter foreign language learning, but it probably does not affect learning in the native language. The results are thus reliable with in the sense that phonological working memory plays a key role in vocabulary acquisition (Baddeley et al., 1988). The researchers claim that this working memory component can have an impact on language processing because it is integrated with language comprehension and production systems. They state that the fact of naturally repeating what is heard (phonological rehearsal), even if it is not initially understood, may help to learn new words by joining sound and meaning. It is possible that individuals with working memory deficits may not be able to rehearse the information they receive, thus losing it and hindering the process of language learning.

Likewise, Service (1992) assessed the acquisition of English with Finnish children, finding that those with good working memory capacity proved to be better at language learning than those with limited capacity, not only in vocabulary, but also in syntax. As stated by the author, English non-word repetition abilities in primary education were a good predictor of success in English learning during the first 2–3 years of formal education (Service, 1992).

Additional research (Harrington and Sawyer, 1992, as cited in Martin & Ellis, 2012) supports the idea that working memory capacity is also involved in SLA, not only in vocabulary learning, but also in comprehension, reading and fluency. They examined the sensitivity of second language working memory capacity to differences in reading skill amongst advanced L2 learners. The tool used to measure working memory capacity was the reading capacity test (Daneman & Carpenter, 1980). The results showed that individuals with larger working memory capacities outperformed in reading skills.

Subsequently, Ellis and Sinclair (1996), studied Welsh adult learners and discovered that those who repeated the language aloud had a better performance on vocabulary learning. It was established that the more often L2 structures are rehearsed the easier it is to learn them and to generalize rules from them.

Fortkamp (1999) developed another study with a working memory task, this time related to the speaking capacity. In the study, participants were given a word list and were asked to come up with sentences, each incorporating one of the words they had on the list. The scores in this task also correlated with scores of L2 fluency.

Kormos and Sáfár (2008) demonstrated that working memory can be associated with L2 skills such as reading, speaking, and listening and their findings evidenced a correlation not only

between working memory and such abilities but also between working memory and vocabulary knowledge (Martin & Ellis, 2012).

The previously cited evidence leads to infer that there is a clear connection between working memory and language acquisition. It is said that the latter is largely reliant on working memory capacity, i.e. the extent to which it can hold new information and process it.

4.5 WORKING MEMORY PROBLEMS AND LEARNING DIFFICULTIES

Working memory and learning are two important factors that are correlated in attempting to learn a foreign language. Memory offers the opportunity to store relevant information studied in the lessons to be later retrieved and utilized in tasks that require good command of the language lexicon.

Gathercole and Alloway (2007) explain that there exist specific situations or indicators that can seriously affect working memory capacity in learners thus being unable to temporarily store information and lose it hastily. Such indicators are: first, distraction, defined as a thought that suddenly comes to mind, or an exterior interruption that causes to divert attention in classroom tasks; secondly, when students try to hold too much information it is likely to fade away rapidly. Finally, while being engaged in demanding tasks with difficult mental processing and remembering, students can reduce the amount of space in working memory to store information.

Owing to age, attention deficits, cognitive disabilities or the factors described above, individual differences, in the efficacy with which the working memory system functions, would be evident in language acquisition in terms of: the ability to remember new information encountered while reading, the ability to make inferences about information encountered while reading, the ability to access knowledge from long-term memory, and the ability to integrate new

information with knowledge from long-term memory (Daneman & Hannon, 2007).

Given that working memory plays an important role in these broader cognitive processes and abilities, it is considered to be one of the most critical components of cognitive development and linguistic achievement. Individuals with larger working memory capacity are better able to learn vocabulary (in both first and second languages), write better, and have better L2 reading and listening comprehension (Atkins & Baddeley, 1998; Daneman & Hannon, 2007). These empirical facts support the claim that working memory capacity plays a significant role in predicting foreign language acquisition (Service, 1992).

The structure and functioning of working memory have proved to be key elements for input to become part of long-term memory, thus allowing learning to take place. Learning is a process that heavily relies on the ability to process, store and manipulate information over the short term in order to complete a task successfully in different domains, being language learning one of them. As a result of the tight link between working memory and learning, limitations in the former can have an effect on the latter.

As stated before, working memory capacity can vary from person to person and those with working memory difficulties can only hold fewer pieces of information mentally. In classroom settings, in particular, students with working memory difficulties may hear teachers' directions and instruction, but this load of information overwhelms their working memory system and so it is partially or completely lost. Therefore, they are unable to complete classroom tasks and achieve class objectives. In Addition, L2 learners can present indicators of working memory limitations that teachers should be paying close attention to. Such limitation can be evidenced when learners struggle to remember new vocabulary or grammar rules, struggle to follow guidelines for tasks or display poor attention in the lessons (Can Learn Society, 2013).

Consequently, Holmes (2012, 8) states that: "given the heavy working memory demands of classroom instructions and activities, it is perhaps unsurprising that one of the key characteristics of children with working memory deficits is poor educational attainment".

4.6 APPROACHES THAT SUPPORT APPLYING WORKING MEMORY STRATEGIES

It is imperative to highlight that with the implementation and execution of the strategies herein described, various tenets of some EFL approaches and methods were adopted during the implementation of the strategies with the experimental group of this research study. The participants were exposed to communication opportunities fostering interaction, collaboration and language authenticity through various classroom tasks. They also potentiated and discovered learning styles and multiple intelligences and other principles of language learning. Here is a brief theoretical description of the approaches that were incorporated in parallel with the implementation of the strategies to potentiate working memory capacity, which, at the same time, underpin and make the application of these strategies more solid theoretically.

4.6.1 Cooperative Language Learning (CLL).

CLL has been designed to provide students with a more active role in their learning process. The achievement of learning goals is meant to be the result of interaction, negotiation of meaning and commitment within classroom groups with the objective of making language learning a more effective and meaningful experience (Richards & Rodgers, 2001). Johnson & Johnson (1994) define it as a relationship in a group of students that requires them to have positive interdependence, a sense of sink or swim together, individual accountability, interpersonal skills such as communication, trust, leadership, decision making, and conflict resolution, interaction, and reflection on how well the team is functioning and how to function

even better. But it is not the group configuration that makes CLL distinctive, in fact, the way in which teachers and students work is what really counts. In a CLL-based classroom, learners are constantly encouraged to have a "positive interdependence" (Larsen-Freeman, 2002), which allows them to work cooperatively instead of being in a non-sense competition towards the L2.

Moreover, cooperation amongst learners can be fostered through the working memory strategies designed for this study since they rely on the effort of each member who need to responsible for the success of the team as a whole. Thus, cooperative learning is also facilitated by these strategies through working memory intervention.

4.6.2 Communicative Language Teaching (CLT).

CLT regards the communicative competence as the ultimate goal of language teaching by admitting the interdependence of language and communication (Larsen-Freeman, 2002). This student-centered approach seeks to enable learners to communicate in the L2 through authentic materials, language games, role-plays, peer and group interaction and more tasks aimed at developing their communicative competence. Also, the L2 is regarded as a vehicle through which the lesson develops and reaches its content objectives and not only as the subject to be studied.

Concerning the roles of teachers and learners in a CLT lesson, there is a shift from the authoritative teachers' role and the passive learners' one. Richards (2006) argues that learners are involved in cooperative classroom activities by creating a rapport with peers and instructors. Additionally, learners are expected to take on a greater degree of responsibility for their own learning as teachers generate appropriate classroom conditions for language learning.

Also, most working memory strategies designed in this study are aimed at developing learners' communicative competence by providing them varied chances suitable to produce L2

output as well as encouraging them to take on a more participative role in their own learning process.

4.6.3 ESA: Engage, Study and Activate.

Harmer (2001) proposes ESA (Engage, Study and Activate) as an English teaching model for today's classrooms. It consists of three pedagogical stages that are constituted as follows:

Engage: learners get more easily involved in classroom tasks that catch their attention. Hence, the teacher should bring fun and challenging tasks for students, and at the same time, to foster learning.

Study: The central attention here is on how language is structured in terms of grammar, vocabulary or pronunciation by means of diverse ways that will depend on the teacher's approach and methodology. In this phase, new information can be presented or learned information can be revised again.

Activate: It refers to the practice of the language through tasks designed to use English for communication purposes. Without this phase, learners may have difficulties turning classroom tasks into real communication. In this part, there are activities such as role-playing, debates, writing tasks and discussions amongst others to help students activate studied pieces of information.

Furthermore, this 3-stage model for teaching languages has a solid pedagogical structure since first, students' attention is caught with innovating activities, then the target language content is addressed and then the students' production is activated through the development of the tasks herein proposed. Therefore, working memory intervention can be related to Harmer's model in the sense that they both follow a logical sequence aimed at presenting language in a pedagogically organized manner.

4.6.4 Lexical Approach.

Developed initially by Lewis in the early 1990's, the lexical approach to language teaching and learning focuses on developing students' proficiency with lexis, words and word combinations, and it has become an alternative to grammar-based methods. Likewise, it focuses on the basis that language learning is directly associated with the capacity for comprehending and producing lexical phrases as chunks, and that "these chunks become the raw data by which learners perceive patterns of language traditionally thought of as grammar" (Lewis, 1993. 95). It advises that teachers should spend more time helping learners develop their inventory, and less time on grammatical structures.

Language lexis, according to Ramirez (2012), must be acquired through both direct study and large amounts of quality input. Pupils frequently struggle with lexical and grammatical relationships and the most common difficulties relate to studying words in the areas of recognition, understanding and production. Though, classroom practice has shown that the lexical approach can motivate learners' interest and enthusiasm in the language (Ramirez, 2012).

Besides, working memory capacity is trained in this study to assist learners retain lexicon more easily to then transfer it to long-term memory. Consequently, it can be said that the more working memory capacity, the more students will be able to hold L2 words in classroom tasks.

4.6.5 Task-based Instruction.

The main objective of TBI is to provide learners with a natural context so language takes place. When students are completing classroom activities or tasks, they are said to interact in order to facilitate and promote language acquisition. Larsen-Freeman (2002) affirms that by interacting with others, learners get to listen to language which may be beyond their present

ability, but which may be assimilated into their L2 knowledge to use afterwards. TBI sees education and language learning as an effective process when it is experience-centered relating to students' real needs. Students are motivated by their personal involvement and teachers are co-learners, asking questions to the students, who are the experts in their own lives (Larsen-Freeman, 2002). Likewise, Powers (ND) claims that TBI is appropriate for all ages and backgrounds, especially young learners since they have learned their L1 in a contextualized setting, learning grammar and structure inductively focusing on meaning, not form. Nevertheless, a constant concern is that TBI demands resourcefulness from the language teachers who are required, on a regular basis, to devise meaningful tasks for their particular students' needs.

Besides, the strategies designed can also be considered tasks that foster students' engagement, motivation and interaction amongst them and, at the same time, they are oriented to boost learners' memory capacity to hold L2 lexicon to then be transferred to long-term memory and be learned.

4.6.6 Multiple Intelligences.

Gardner's multiple intelligences theory developed in the late 1970's and early 1980's offers an understandable conception that human beings have several intellectual capacities to perform learning tasks. They are regarded as ways to demonstrate intellectual ability since students possess different kinds of minds and therefore learn, remember, perform, and understand in different ways (Gardner, 1993). The following wheel can clearly represent the MI theory proposed by Gardner who came up with several different types of intelligences, or learning styles.

Multiple Intelligences

Taken from: http://www.connectionsacademy.com/Libraries/blog/multiple-intelligences-learning-styles.jpg

The web page called Virtual Learning Connections (2016) offers a very detail description of the intelligences; they are as follows:

1 Verbal-Linguistic: People who possess this learning style learn best through reading, writing, listening, and speaking. Verbal students absorb information by engaging with reading materials and by discussing and debating ideas.

2 Logical-Mathematical: Those who exhibit this type of intelligence learn by classifying, categorizing, and thinking abstractly about patterns, relationships, and numbers.

3 Visual-Spatial: These people learn best by drawing or visualizing things using the mind's eye. Visual people learn the most from pictures, diagrams, and other visual aids.

4 Auditory- Musical: Students who are music smart learn using rhythm or melody, especially by singing or listening to music.

5   Bodily Kinesthetic: Individuals learn best through touch and movement. These people are best at processing information through the body. Sometimes kinesthetic learners work best standing up and moving rather than sitting still.

6   Interpersonal: Those who are people smart learn through relating to others by sharing, comparing, and cooperating. Interpersonal learners can make excellent group leaders and team players.

7   Intrapersonal: Intrapersonal-intelligent people learn best by working alone and setting individual goals. Intrapersonal learners are not necessarily shy; they are independent and organized.

8   Naturalist: Naturalistics learn by working with nature. Naturalistic students enjoy learning about living things and natural events. They may excel in the sciences and be very passionate about environmental issues. ("Virtual Learning Connections", 2016)

There are also two more intelligences that have been added to the previous list in order to complement aspects that were initially neglected in relation to people's diverse abilities. They are as follows:

9   Existential: Sensitivity and capacity to tackle deep questions about human existence such as: What is the meaning of life? Why do we die? How did we get here?

10 Digital: Sensitivity and capacity to use, understand and get involved with technological devices in various contexts.

Memory and multiple intelligences can be related pedagogically since learners resort to their preferred intelligence to best retain vocabulary presented in the designed strategies. Moreover, multiple intelligences can offer various alternatives to digest content vocabulary in any class procedure. The relevance of this composite of intelligences is that ESL/EFL teachers who recognize multiple intelligences are often aware that students have specific strengths, which are often neglected in classroom situations.

5. PREVIOUS RESEARCH

There is a large amount of information regarding working memory learning (Baddeley, 2000; Baddeley & Hitch, 1974; Gathercole & Alloway, 2008; Thompson & Holmes 2008), its structure and how this is connected to the completion of a wide range of cognitive tasks that ultimately lead to learning.

Atkinson & Shiffrin (1968), Baddeley, (1992, 2000) and St. Clair-Thompson & Holmes (2008), show that there are factors that may account for working memory deficits, which can affect learning and educational attainment. In recent years, studies have focused on designing strategies to counteract the difficulties stemming from poor working memory (Gathercole & Alloway, 2008; St. Clair-Thompson & Holmes, 2008). One way to reduce the chances of failing due to working memory problems is to have teachers control memory loads in the classroom (Gathercole & Alloway, 2008). Another technique is to tackle working memory directly by training students to consciously employ memory strategies that allow them to use memory more efficiently. This strategy involves providing direct guidance and practice on working memory tasks (St. Clair-Thompson & Holmes, 2008).

A series of studies have been carried out on the subject and have shed light on the steps to take when faced with students who have working memory problems. For instance, St. Clair-Thompson and Holmes (2008) conducted a study that tested the effect of a memory training strategy, *Memory Booster* (Leedale, Singleton, and Thomas, 2004 as cited in St. Clair-Thompson and Holmes, 2008) on children's working memory. Forty-four children aged 6-7 years and forty-three children aged 7-8 divided participated in the study, an experimental and a control group. The participant took four memory measurements designed to work on the phonological loop, visuo-spatial sketchpad and central executive, which were calculated with standardized measures.

They carried out those tasks two times with a gap of 12 weeks in between. In the 12 weeks, the experimental group used Memory Booster Program whereas the other did not have involvement. Each child in the experimental group used the Memory Booster program 18 times with the guidance of the teacher. The findings showed that Memory Booster helped substantially to improve the storage and processing components in 6-7 year old participants (Baddeley, 2000; Baddeley and Hitch, 1974). It was concluded that 6-7 year olds improved their recall capacity significantly,

Finally, St. Clair-Thompson and Holmes (2008) conclude that the fact that memory strategy training was able to enhance children's development on working memory activities has essential effects in education and it can offer important contributions for students' academic performance.

Similarly, Spencer (2011) studied whether content vocabulary recall can be improved by using flash cards and memory games in children with learning debilities. 33 participants took a pre-test with multiple-choice questions containing information previously presented. Once the pre-test was taken, the participants received guidance on the use of strategies based on flashcards to reinforce the vocabulary to solve equations. Teamed up in groups of 8 or less, they were asked to come up with definitions for the words to be written in a note card. For 8 weeks, the participants used their note cards to remember the vocabulary, terms and definitions by means of in-class games oriented to tap into their memory through student-to-student challenges. After this eight-week period, they were to take the same pre-test as post-test under similar conditions.

The results showed great improvement on questions that require word recognition, however, no improvement was seen in areas that required more than simply identifying the correct vocabulary terms. As a conclusion, Spencer (2011) stated that this strategy contributed to

improve problem solving based on vocabulary; but the strategy fell short when learners were asked to give more than a definition. Using flashcards and memory games is an effective way to learn content vocabulary. Spencer (2011) suggests that memory and retention capacity can be enhanced employing by the use of strategies and techniques periodically and that it implies making students notice how their memory best functions so they can make gradual progress by themselves.

Gathercole and Alloway (2008) applied the principles of reducing the memory load, repeating and review, using of memory aids amongst others in primary schools in the UK to help teachers identify strengths and weaknesses and to offer some intervention approaches in order to minimize learning difficulties. Teachers claimed that the intervention approaches were easy to incorporate in the classroom. Also, they observed gradual improvements in concentration and in following instruction as a result of the intervention (Gathercole & Alloway, 2008). Even though the evidence presented is not conclusive, it is a strong foundation for future research on how training working memory may positively impact pedagogical attainment.

6. RESEARCH METHODOLOGY

6.1 RESEARCH DESIGN

This research design was experimental since individuals, in this case learners, were measured before and after the intervention of the strategies employed to enhance their working memory capacity. Furthermore, this experimental research tested some strategies to determine if they made a difference in learning vocabulary. There was a control group and a test group. One group received the intervention (experimental group) and the other group (control group) did not receive such intervention. Moreover, there was a pre and post-test for both groups in this experimental design. Additionally, this study employed a quantitative method since it emphasized objective measurements and statistical analysis of the data gathered by means of surveys and classroom tasks. Also, this study focused on obtaining percentages and numerical data to account for particular students' capacity to retrieve previously introduced L2 vocabulary.

Action research was also part of this study because it began with an initial identification of a problem to be addressed in order to have an action plan. Once the action plan was executed, the phase of evaluating its implementation came and finally the findings were reported.

6.2 PARTICIPANTS

The participants of this study were 50 students from the University and more specifically from English language courses offered to different undergraduate programs such as Medicine, Engineering, Arts, International Trade, Psychology, Law, Philosophy amongst others. Their ages range between 18 and 24 years and they usually come from households with a medium socio-economic stratum. The learners' academic background is the product of a 6-year formation in regional public and private high schools whose intention is to create students willing and capable

of pursuing superior education objectives.

Additionally, the participants were observed for around four months receiving L2 instruction in the four skills for communicative purposes at a beginner level. The experimental group had 28 students, 13 males and 15 females, whereas the control group consisted of 22 students, 3 males and 19 females. It can be said that both groups share similar sociocultural and economic backgrounds as well as their willingness to learn English for personal and professional purposes.

6.3 INSTRUMENTS

The first instrument was a survey (See Appendix 1) applied to the participants at the beginning of the study to find out which processes were utilized to grasp, retain and apply language vocabulary studied in the English lessons. Then, this survey was analyzed to know potential causes of poor working memory indicators and to determine possible ways to tackle weaknesses and ways to enhance strengths.

Likewise, a pre-test (See Appendix 2) measuring current learners' vocabulary was applied and the same was applied as a post-test after employing the set of working memory boost strategies to measure how much vocabulary was indeed learned. The post-test also determined the effectiveness of the strategies chosen to enhance and train working memory capacity oriented to L2 vocabulary learning and apprehension.

Also, checklists (See Appendix 3) were employed during class instruction in order to identify indicators of poor or strong working memory capacity such as task completion, task engagement, instructions understanding, attention span, listening comprehension, reading comprehension, access to previous knowledge, grasp of new vocabulary, remembering procedures among others. These checklists were filled out as the tasks progressed to document

learners' performance as accurately as possible.

Class observation (See Appendix 15) was also a crucial part in the study, because the teacher was in constant contact with the students by observing, monitoring and documenting the learners' performance, progress and reactions to the strategies applied. Class observation findings were annotated during and after the learners' performance, noting down their positive and negative responses, arising issues and any other behavior worth describing and analyzing afterwards. The observing time depended on the extension of the tasks as some took up to one hour whereas others took only 15 minutes and they were carried out periodically in a time frame of 3 months.

6.4 PROCEDURE

The initial step in this research process had to do with the planning stage where a problematic situation in EFL was identified and narrowed down to determine its relevance to conduct a research project. Then, a review of the pertinent literature was done to have a sound theoretical foundation upon which the study was based. The next step was to state the research question intended to be answered at the end of the process. Once the question was stated, the appropriate research methodology and research design were established.

Next, the phase of data collection was done through the instruments (survey, pre-test, strategies' implementation, observation, field notes and post-test) previously selected. Then, the strategies designed were applied and developed. After that, the step of the analysis and interpretation of the data gathered was conducted in order to finally present statistically and objectively the findings obtained throughout this research process. This process and the steps followed are represented in the graph below for a better understating.

Graph 1. **Overall Research Procedure**

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│  Literature Review  │
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│  Research Design    │
│   Determination     │
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│      Results        │
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7. RESULTS

The methodology of this research study as described above, yielded the following results described below:

1. Interview designed to find out learners' perceptions towards vocabulary retention and learning English in general.

The interview administered at the beginning of this study with 50 students, from both the experimental and control group, obtained the learners' perceptions with regards to the possible techniques applied to retain vocabulary seen in lessons and how effective they have been for them. The survey questions were written in Spanish to facilitate and elicit students' real thoughts and to make them feel calm when responding. Consequently, the graphs below show the original questions in Spanish to expedite their analysis and presentation.

Question 1. ¿Qué haces para retener y recordar información, conceptos, vocabulario en Inglés?

Graph 2. Survey Question Number 1

Graph 2 shows the different answers from the students in the question number 1. It can be observed that in order to retain and remember information, concepts and vocabulary in English 28 students mentioned that they tend to write the word repeatedly. 10 students stated that pronouncing the word out loud helps them remember it better, 7 students used examples containing the words to be retrieved and 3 students claimed that reading and listening to music contributes to word retention.

Question 2. En caso afirmativo en la pregunta 1, por favor describe brevemente la técnica que usas para aprender vocabulario en Inglés.

Graph 3. Survey Question Number 2

Graph 3 illustrates the different answers from the students in the question number 2. It can be seen that 24 students described their technique by means of the use the dictionary to remember words and 10 students described their technique in terms of drill writing and another 10 students' description was related to pronouncing the word out loud. Moreover, 2 students explained their technique through the use of direct translation, 3 students tended to associate words with objects and only 1 student described the drawing technique.

Question 3. ¿Tienes resultados positivos con la técnica que describiste en la pregunta 2?

Graph 4. Survey Question Number 3

Graph 3 portrays the learners' answers to the question number 3. It can be observed that 35 students argued that their techniques applied to retain vocabulary in the L2 were effective. Meanwhile, only 10 students marked that their techniques were not effective and 5 students expressed that their techniques sometimes worked for them.

2. Development of strategies designed to boost working memory capacity

The development and execution of the strategies aimed at boosting learners' working memory capacity with only the experimental group, consisting of 28 students, yielded the results and percentages consigned below:

Strategy 1. Reducing the memory load

This strategy broke task instructions down into smaller steps to be better processed by the learners. It also tried to keep new information or instructions brief while providing written directions for further reference. It was also designed to provide information in multiple ways: speak it, show it, and create opportunities to physically work with it or model it. The tasks per se consisted of a story divided into five scrambled parts. Students had to fill in the blanks with the correct past forms of the verbs given in each part, then, students have to organize the story in a logical sequence. After that, they had to understand the story appropriately in order to provide a suitable title. Once the title was written, they were asked to write a similar narration based on the general ideas and verbs from the previous story. Last but not least, they presented their product orally to the whole class and answered their peers' questions. The results are shown in Graph 5.

Graph 5. **Strategy 1. Reducing the Memory Load**
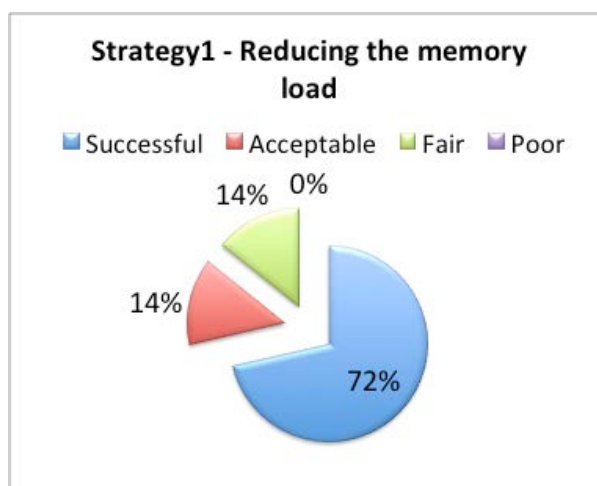
After analyzing and interpreting the development of task1, it can be stated that 72% of students achieved completion of the task by, first, filling in the gaps with the correct past verb forms, secondly by understanding and organizing the story in a sequence, thirdly by providing the story with a title according to the context of the story and finally by creating a similar narration

using the verbs proposed. However, only 14% of the students completed the first 3 stages of the

tasks because they failed to come up with a similar story. Finally, another 14% of the students

complied with the first two parts and they could neither provide a title nor create a similar written

composition. The criteria for successful performance in this task are as follows:

1. Students are able to fill the gaps correctly.
2. Students can organize the correct sequence of the story.
3. Students are able to provide a logical and adequate title
4. Students are able to come up with a similar narration using verbs studied
5. Students are able to report orally to the class their own story.

**Strategy 2. Triggering learners' retention by color code**

The use of consistent colors helped learners remember the information presented more

easily. In this case, verbs, nouns and their L1 translation were to be matched and hopefully

memorized. Physical coding, such as consistent colors for different subject areas, can help

students remember information. This strategy promoted color-coding when teaching new words

in categories or families.

The students were given some words (verbs in red and nouns in green) from the previous

pre-test activity at the beginning. These words were printed out and cut individually for them to

touch them and interact with them. Then, they had to match meanings / translation. Next, they

memorized them by challenging their classmates about their meanings in English and Spanish.

After that, the next activity consisted of having the students listen to a recording in which

some of the words above were pronounced. In small groups, they had to translate the words heard

into Spanish. The group that had most correct participations had a reward. The next step was to

play a "*Concéntrese*" game in which all these words were displayed. The students had to

visualize the English words and their Spanish equivalent translation. Volunteers came forward

and participated freely as the rest of the class rooted for them. In this case, they paid attention to meaning and position. The results are shown in graph 6.

Graph 6. **Strategy 2. Triggering Learners' Retention by Color Code**
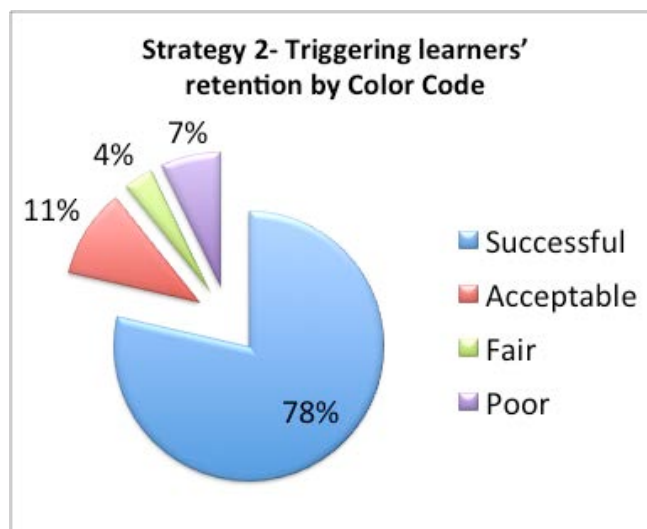
The results obtained show that 78% of students were able to recognize all the word-translation pairs effectively assisted by colors. However, 11% could only recognized a few pairs, 4% had some difficulties to match pairs. Lastly, a 7% presented serious problems with the pair recognition and therefore did not fulfill the tasks correctly. The criteria for successful performance in this task are as follows:

1. Students are able to match English-Spanish word pairs adequately.
2. Students can recognize and translate English words into Spanish while listening to them.
3. Students are able to pair as many words as possible in the "*Concéntrece*" Game.

Strategy 3. Encouraging the use of memory aids

The use and creation of visual posters for commonly used words was the main objective of this strategy. It sought to give instructions through written material and have learners create their own.
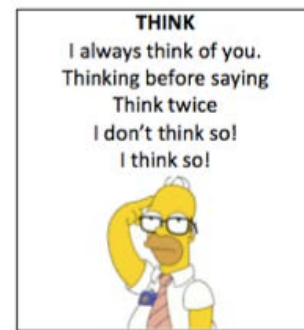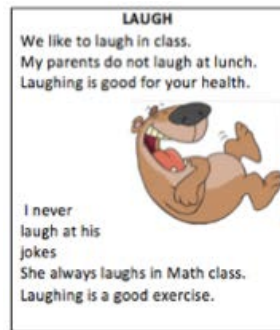
Students were required to create posters of words important for them to and then write as many sentences as they can, including the word. They had to also include images or drawings. The results are shown in graph 7.

Graph 7. Strategy 3. Encouraging the Use of Memory Aids
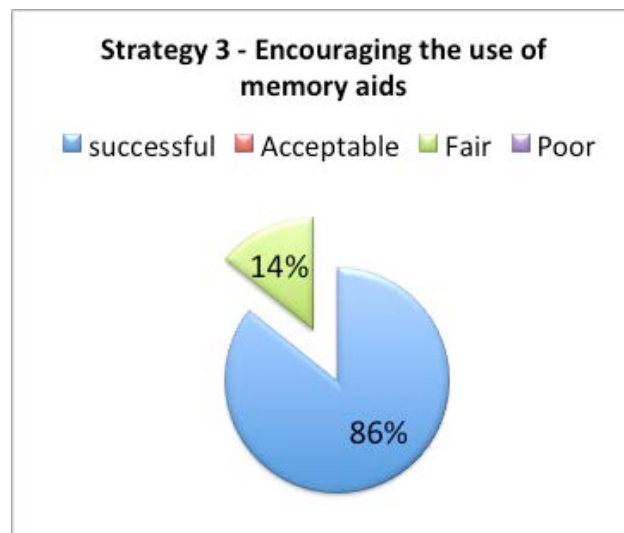
The results obtained from applying this strategy of posters describe that 86% of could develop the activity as expected by choosing a pertinent word, by writing sentences correctly and by giving a logical and appropriate explanation of their poster to the whole class. Nevertheless, only a 14% were able to select a pertinent word and create correct sentences out of it and the words chosen were not even studied in the class. The criteria for successful performance in this task are as follows:

1. Students are able to choose an appropriate word from the class to create their posters.
2. Students can come up with grammatically correct sentences using the word chosen.
3. Students are able to present to the class their poster with easiness.

Strategy 4. Reinforcing learning preferences

This strategy was intended to encourage self-reflection for the teacher and the student and determine what actually worked for them. Socrative and Kahoot are classroom technology-based techniques through which teachers can observe students' level of comprehension and understanding of a certain grammar component or any other class objective by means of a different way. Most students normally feel embarrassed when providing answers to the whole class even if they do know the correct answer; they feel on the spot where their anxiety increases rapidly. As the activity is done, the teacher has an idea of student understanding of the topics and content studied and revised. First, learners used their mobiles to answer a series of questions, projected onto a large screen, based on the lesson and then actively choose the correct answers. Later on in class, the teacher provided feedback to the whole class on the activity. The results are shown in Graph 8.

Graph 8. Strategy 4. Reinforcing Learning Preferences

The tools applied in this strategy were electronic instruments (Socrative and Kahoot) that helped to reinforce word learning and memorization in a didactic and fun manner. It can be then stated that 71% students developed the activity by answering all the multiple choice questions right, 11 % of them answered the question with some difficulties, another 11% showed a low number of right answers and only 7% of the learners did not achieve the task objective as they did present major difficulties with the questions posed. The criterion for successful performance in this task is as follows:

- Students are able to answers the questions posed correctly and give a brief grammatical explanation.

Strategy 5. Encouraging memory aids by clustering

The strategy sought to encourage students to make lists of reminders regularly by using graphic organizers while learning information and new concepts to retrieve them afterwards. They used boards to draw their clusters and explain them to the whole class.

Graph 9. **Encouraging Memory Aids by Clustering**
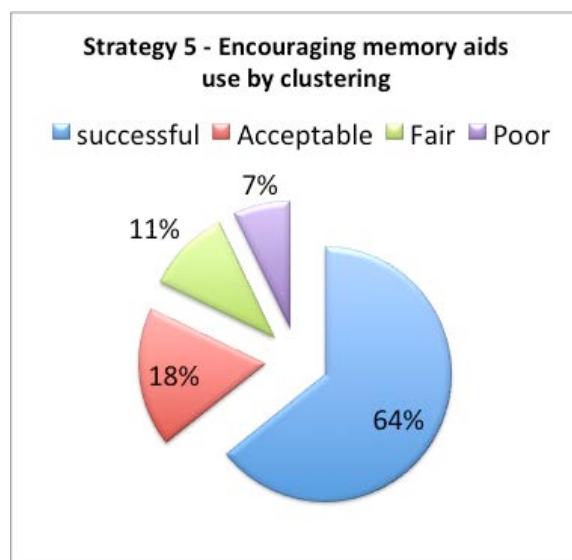
Clustering was a didactic strategy to retain L2 vocabulary that yielded significant results worth talking about in this study. The findings show that a substantial number of students (64%) were able to reach the tasks objective. They selected a word and could effectively and logically relate it to other expressions and words. Nonetheless, 18% of the students presented minor hardships creating logical and correct relations between the word chosen and their possibilities. Only small percentages (11% and 7%) displayed a performance that was not expected and could hardly come up with correct word clusters. The criteria for successful performance in this task are as follows:

1. Students are able to make clusters using a word introduced and presented in class.
2. Students can relate the words to other expressions. (Word families)

Strategy 6. Introducing advance organizers

Using advance organizers and teaching students how to use them can be beneficial. For example, KWL (What I Know, What I Want to Know, What I Learned) is a graphic organizer that helps students focus on what is to be learned. This tool activates prior knowledge, helps

generate questions to explore and then assists students to connect new knowledge to what they already know.

Graph 10. Strategy 6. Introducing Advance Organizers

As the graph above shows, 89% of students were able to fill in the KWL chart with the appropriate information required from them in each category. Meanwhile, 11% did not provide adequate information and included different ideas that were not called for in the task. The criterion for successful performance in this task is as follows:

-Students are able to provide pertinent information in the different categories of the KWL charts.

Strategy 7. Fostering vocabulary retention by working on the phonological loop I

In this task, students listened several times to a group of words without seeing them and without knowing their meaning trying to memorize as many as they could. Then, they were required to repeat them loud. Next, the teacher handed over the words in pieces of paper and they had to organize them in the order that they had heard and check the meaning with the guidance of the teacher. Then, they were shown a set of pictures to which they had to match the words heard

before. Finally, they were to describe a famous person/place by employing the words learned and

the rest of the class tried to guess the person talked about. The results are shown below:

***Graph 11*. Strategy 7. Fostering Vocabulary Retention by Working on the Phonological Loop I**

The graph above illustrates the percentages obtained from the development of the task 7.

It indicates that 53% of the students were able to match the words heard to the pictures shown

and to later utilize those words in an oral composition effectively with the whole class. Likewise,

36% of the students displayed a poor performance during the task development since they could

not relate sounds and images and therefore their oral production was equally low. Finally, only

11% had a fair performance during the sound-image recognition and during the oral production

stage. The criteria for successful performance in this task are as follows:

1. Students are able to match the words they hear to the equivalent image.
2. Students can include the words heard into an oral composition.
3. Students are able to give a short oral presentation of a person using the words they heard.

Strategy 8. Fostering vocabulary retention by working on the phonological loop II

In this opportunity students listened to a couple of physical features and basic clothing vocabulary to identify the character that is being described in the recording. An image was projected onto a large screen so learners could carry it out properly. After this chart was filled, the students were required to come up with a description of a classmate without revealing his/her name so the rest of the class guesses that classmate.

Graph 12. **Strategy 8. Fostering Vocabulary Retention by Working on the Phonological Loop II**

The graph above presents the percentages of the task aimed at retaining spoken information effectively. 52% of students identified the description in the recording and matched it with the visual description; they also describing a classmate orally with the words heard correctly. However, 42% were unable to recognize the sound-image pairs and thus the oral production part was not adequate. Lastly, only 7% of the students presented a fair outcome while listening and producing language during the tasks proposed. The criteria for successful performance in this task are as follows:

1. Students are able to correctly match visual information with the information heard.
2. Students are able to describe a character by using the words previously introduced.

Strategy 9. Fostering vocabulary retention by working on the phonological loop III

This task consisted in giving learners a chart with some missing words. Then a recording with a sequence of 3 sentences was played so they could find the place where the missing words fit. Another three sentences were played too until they completed the whole chart.

Graph 13. **Strategy 9. Fostering Vocabulary Retention by Working on the Phonological Loop III**
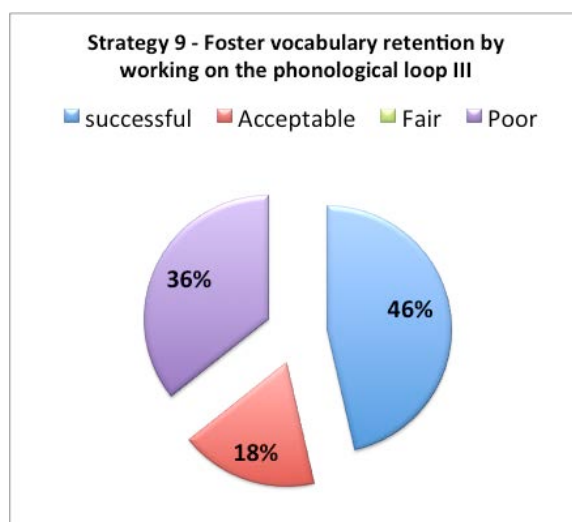
Fostering vocabulary retention through this task yielded the following results. 46% of the students recognized the words played in the recording and wrote them down in the graph provided. Nevertheless, 36% of the learners were not able to jot down the words heard and had difficulty placing them in the correct gaps. And finally, only 18% of the students could match some of the words played and wrote them into the right spaces, some spaces were also completed incorrectly. The criterion for successful performance in this task is as follows:

- Students are able to identify and complete the blanks with the sequence they heard

   previously.

Strategy 10. Fostering vocabulary retention by working on the phonological loop IV.

As a follow-up activity of a certain lesson, learners practiced past tense through a bingo game by actively listening to the verbs called out by the teacher. In small groups, they were given several Call Cards with different present and past verbs to be recognized and covered as fast as possible. This task was intended to provide aural practice and make students more sensitive to speech-based information.

Graph 14. **Strategy 10. Fostering Vocabulary Retention by Working on the Phonological Loop IV**

This final strategy to boost working memory capacity showed that 89% of the students could recognize the words called out and covered them in the Bingo chart that they were initially provided. Only 11% had an acceptable performance but they still were capable of matching most of the words (past form verbs) called out by the teacher. The criterion for successful performance in this task is as follows:

Students are able to match the visual words in their Bingo call cards with the words called out by the teacher.

4. Comparison between the performance of participants in the test before and after the application of the strategies in the experimental group and the control group.

Learners were required to take a pre-test to measure how well they did before the application of the strategies designed to boost working memory capacity. That test (See Appendix 2) consisted of three different tasks that asked students to understand a text, to be engaged with the past tense of the verbs, to challenge their reading comprehension and to perform an oral communication activity based on the whole text and overall understanding of the same. The same test was applied again as a post-test to both experimental and control groups after developing the tasks in order to determine if there was any enhancement in the vocabulary of the students. The results are categorized and analyzed below:

Test Task 1

This task asked students to read attentively and comprehend a text called "*The Wright brothers - men with a vision*" by drawing their attention to how the irregular past forms in English language are formed and work in a written composition. Then, they were to fill in some gaps in several sentences with a suitable verb from the previous text for them to notice how past tense forms are utilized in sentences properly. Finally, this task demanded a global understanding of the entire text by checking students' capacity to state whether some facts and information about the text are true or false and provide a brief explanation.

It is relevant to stress the fact that in order to understand a text, learners are required to recognize and know the words and their meanings within it. Then, the more words they understand and recognize in the task, the better their reading comprehension will be

Graph 15. Results of Pre and Post- Test in the control group
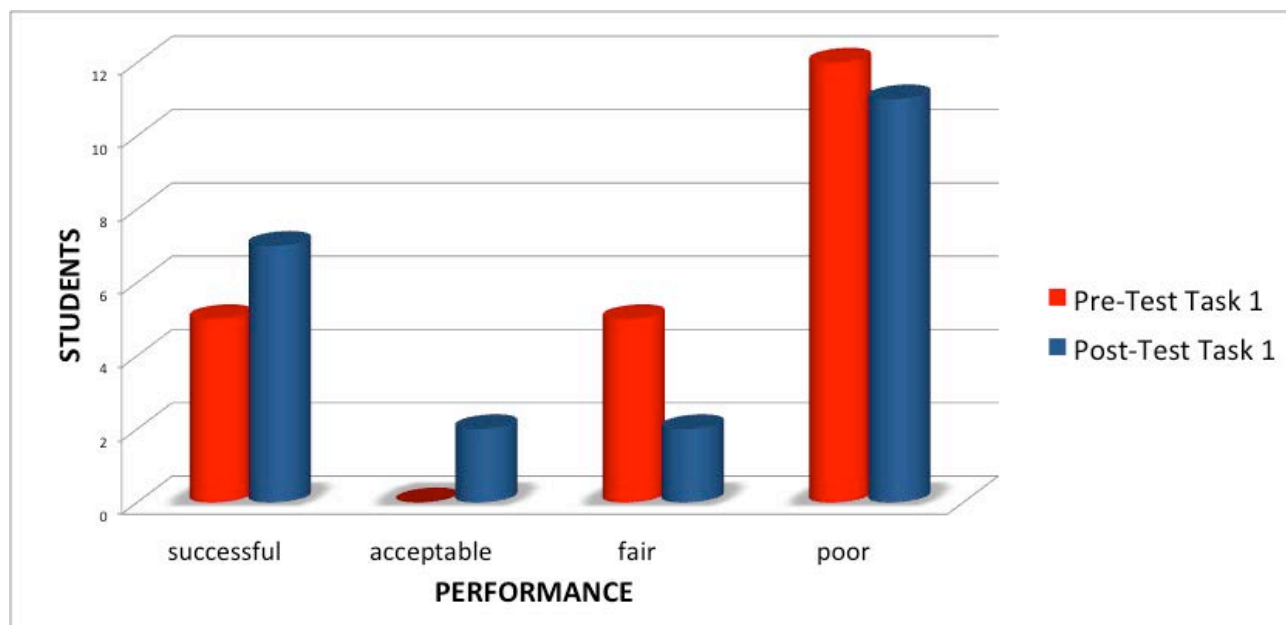
Graph 15 explains and compares the number of students and their performance from the control group before and after the application of the strategies proposed with regards to the test task 1. It can be seen that the number of students with successful performance increased from 23% (5 students) in the pre-test to 32% (7 students) in the post-test. Also, the number of students who had had an acceptable performance in this task passed from 0 to 9% (2 students). However, the number of students who had had a fair performance passed from 23% (5tudents) to 9% (2 students). Finally, the students who had displayed a poor performance before developing the strategies slightly decreased in the post - strategy test, from 54% (12 students) to 50% (11 students).

Graph 16. Results of Pre and Post-Test in the experimental group
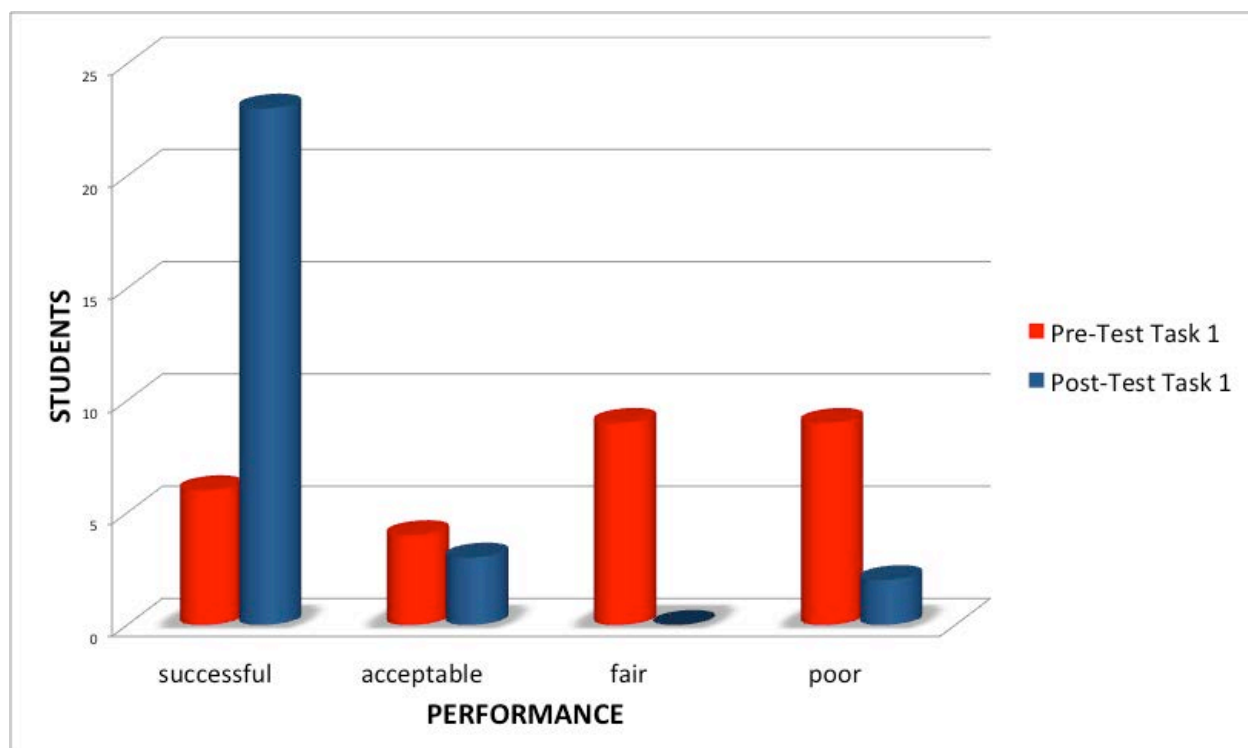
Graph 16 compares the number of students and their performance from the experimental group before and after the application of the strategies proposed with regards to the test task 1. It can be perceived that the percentage of students with the successful performance increased from 22% (6 students) in the pre-test to 82% (23 students) in the post-test. Also, the percentage of students who had had an acceptable performance in this task decreased slightly, from 14% (4 students) to 11% (3 students). However, the percentage of students who had had a fair performance dropped totally, from 32% (9 students) to 0%. Finally, the students who had displayed a poor performance before developing the strategies also decreased in the post - strategy test, from 32% (9 students) to 7% (2 students).

Test Task 2.

This task demanded from students' similar procedures to those found in test task 1. The reading was called *"Robert Goddard- An Incredible Man"* and it drew their attention to how the regular past forms in English language are formed and work within a written composition. After carefully reading the text, they were asked to fill in some gaps with the past forms of some verbs from a chart (previously found in the text). Lastly, they were required to unscramble some words and come up with correct sentences bearing in mind grammar and meaning of the same. These sentences have been extracted from the text read before about Robert Goddard.

Graph 17. Results of Pre and Post - Test in the control group

Graph 17 shows and compares the number of students and their performance from the control group before and after the application of the strategies proposed during the test task 2. In the pre-test, the percentage of students who filled in the verbs and organized the words correctly

was 18% (4 students) and in the post-test that number almost remained the same, 3 students

which is 14%. The percentage of students who were able to acceptably carry out the task with

some difficulties with the past form verbs went from 0 to 14% (3 students). Additionally, those

students who had several difficulties dropped only from 14% (3 students) to 9% (2 students) and

those student who were not able to complete the task as requested in the pre-test with a

percentage 68% (15 students) dropped to just 63% (14 students) in the post-test.

Graph 18. Results of Pre and Post-Test in the experimental group

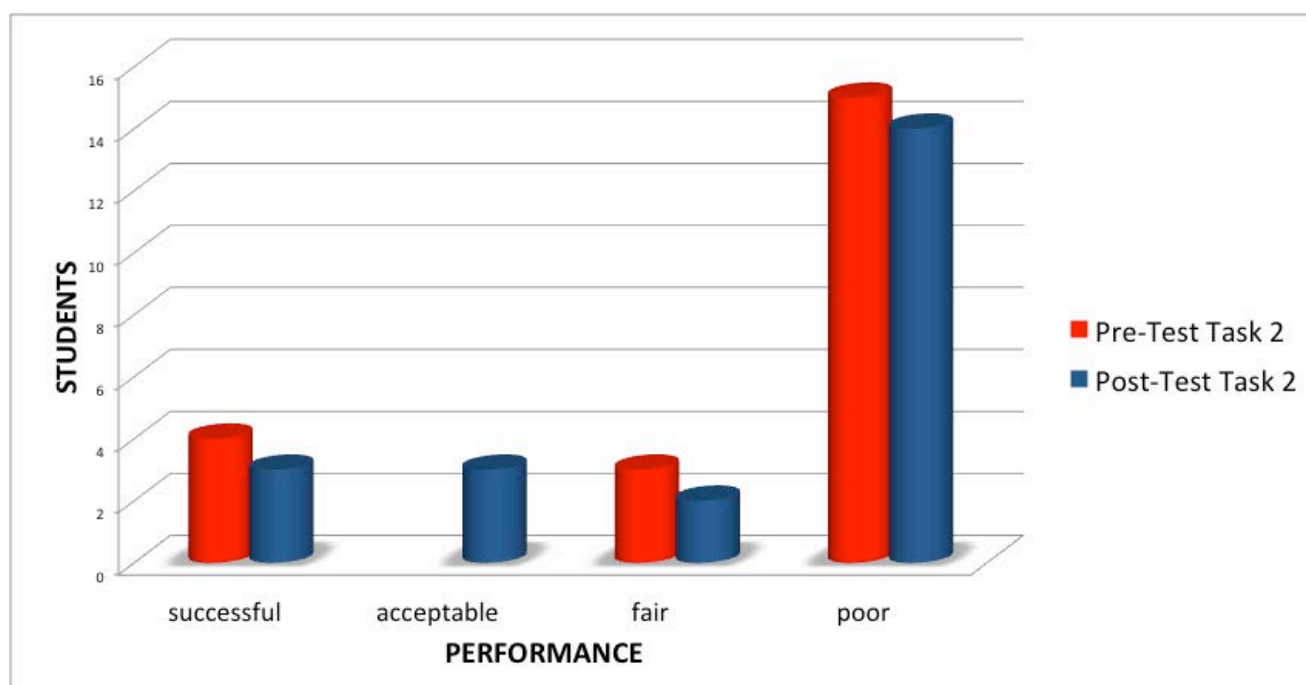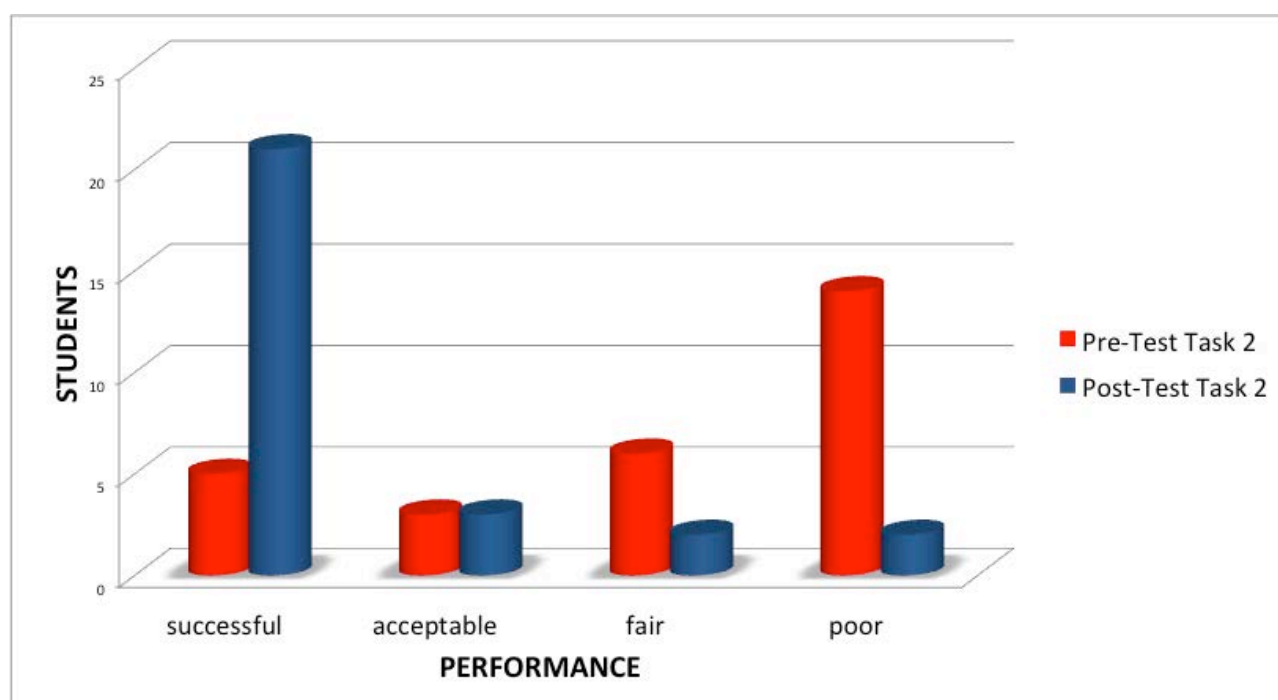Graph 18 illustrates and compares the number of students and their performance from the

experimental group before and after the application of the strategies proposed during the test task

2. In the pre-test, the percentage of students who filled in the verbs and organize the words

correctly was only 18% (5 students) and in the post-test it increased to 75% (21 students). The

percentage of students who were able to acceptably carry out the task with some difficulties with

the past form verbs remained the same, 11% (students). Additionally, those students who had

several difficulties also dropped from 6 to 2 and those student who were not able to complete the task as requested in the pre-test with a percentage of 50% (14 students) dropped as well to 7% (2 students) in the post-test.

Test Task 3.

This final task in the test asked learners to move from the reading and writing component to the speaking and listening component in which they interacted orally based on a card with a role-play to be performed in small groups bearing in mind the regular and irregular verbs from the two previous tasks. Some examples of one of the role-play cards are:

> Imagine you are the U.S president Theodore Roosevelt, and you are going to ask the Wright Brothers about their flying invention. Create a list of questions

> Imagine that you are an important journalist in 1899. Your task is to create a list of interesting questions and interview the Wright brothers by asking them about their creation, previous experiences and general impressions.

Graph 19. Results of Pre and Post-Test in the control group
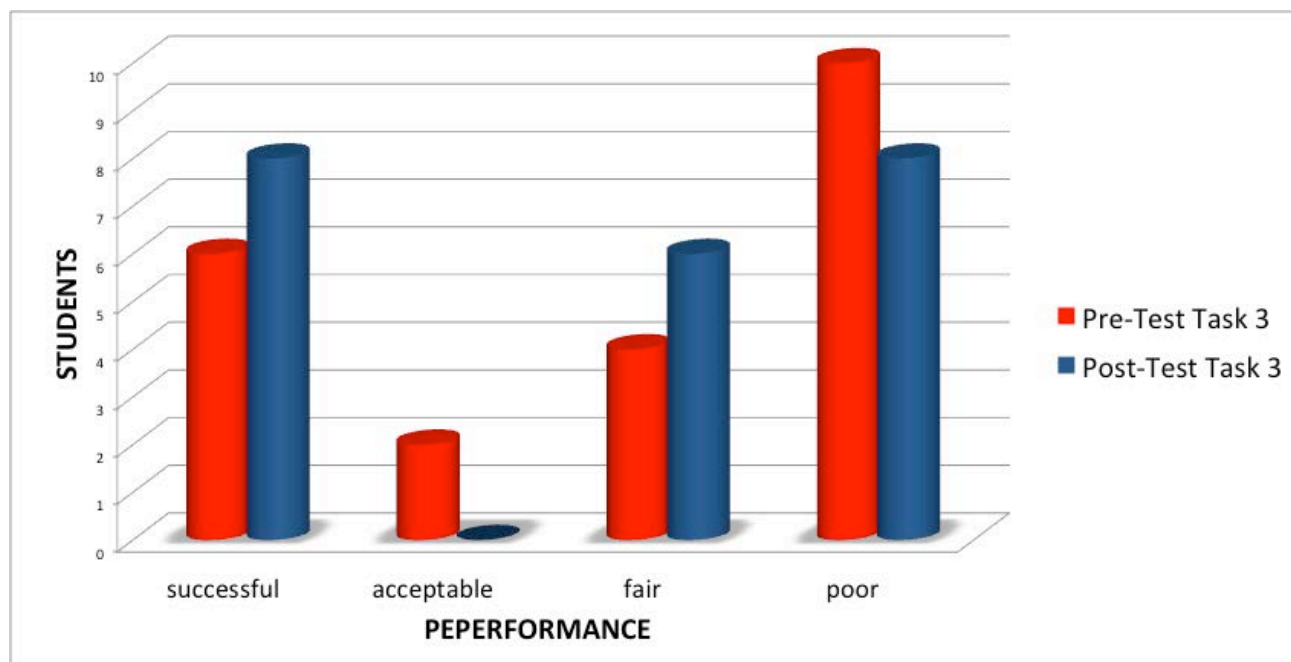
Graph 19 compares the performance of students from the control group in the pre-test and the post-tests with regards to test task 3. It can be observed that the percentage of students who attained completion of the task in the pre-test was 27% (6 students) and it augmented to only 37% (8 students) in the post-test. Additionally, the percentage of students who did not fulfill the tasks' requirements at all in the pre-test was 46% (10 students) and it dropped to 36% (8 students) in the post-test. Besides, the percentage of students who had minor difficulties decreased from 9% (2 students) in the pre-test to 0 in the post-test and finally, 18% of students (4) who had a fair performance in the tasks during the pre-test went up to 27% (6 students) in the post test.

Graph 20. Results of Pre and Post- Test in the experimental group
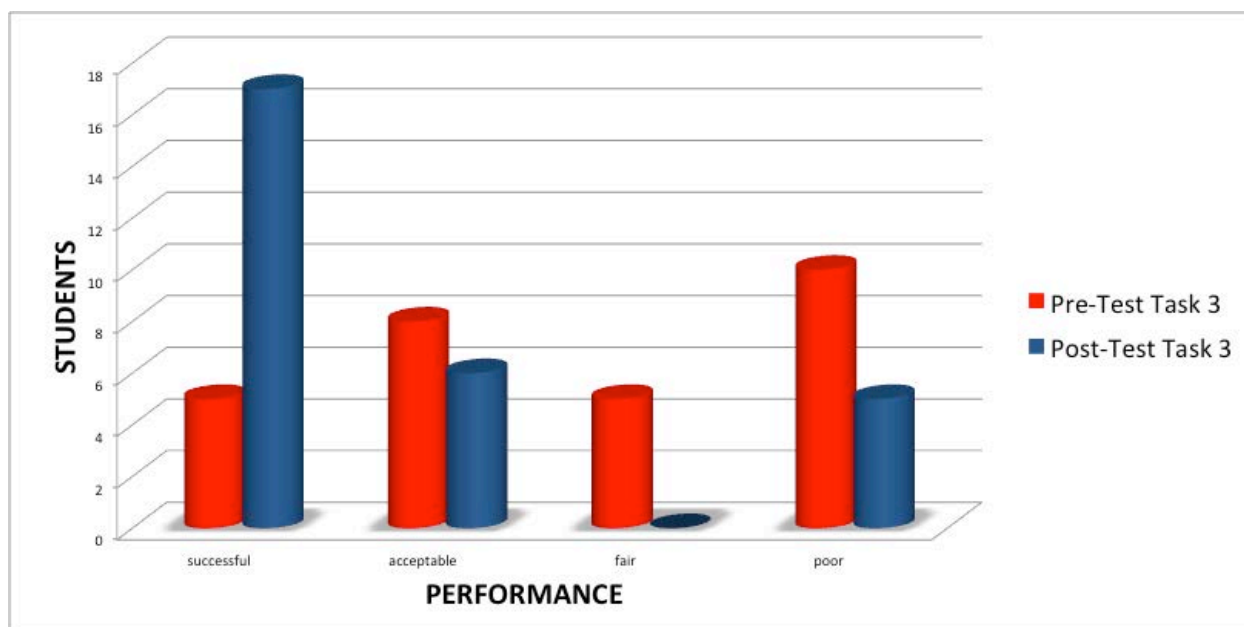
Graph 20 compares the performance of students from the experimental group in the pre-test and the post-tests with regards to test task 3. It can be observed that the percentage of students who attained completion of the task in the pre-test was 18% (5 students) and it augmented to 61% (17 students) in the post-test. Moreover, the percentage of students who did not fulfill the tasks' requirements at all in the pre-test was 36% (10 students) and it dropped to 18% (5 students) in the post-test. Also those learners who had minor difficulties decreased from 28% (8 students) in the pre-test to 21% (5 students) in the post-test and finally, the percentage of students who had a fair performance in the task during the pre-test dropped from 18% (5 students) to 0%.

Graph 21. Post Test Analysis

POST - TEST ANALYSIS		
Task 1	**Control Group**	**Experimental Group**
Performance	**Percentages**	
Successful	50%	82%
Acceptable	32%	11%
Fair	9%	0%
Poor	9%	7%
Task 2	**Control Group**	**Experimental Group**
Performance	**Percentages**	
Successful	14%	75%
Acceptable	14%	11%
Fair	9%	7%
Poor	63%	7%
Task 3	**Control Group**	**Experimental Group**
Performance	**Percentages**	
Successful	37%	61%
Acceptable	0%	21%
Fair	27%	0%
Poor	36%	18%

Graph 21 illustrates a general comparison of the percentages in the performance obtained in the post-test to affirm that there was enhancement in the participants who received the intervention of the working memory strategies in relation to those who only received English instruction of a normal course. The most remarkable aspects to notice here is that the percentages from the experimental group with a successful performance is higher than the percentages from the control group; 82% and 50% in task 1, 75% and 14% in task 2 and 61% and 37% in task 3 respectively. Additionally, the percentages of poor performance in the experimental group are lower than the percentages in the control group in task 1, 9% and 7%, in task 2, 63% and 7% and in task 3, 36% and 18%.

8. ANALYSIS AND DISCUSSION

The strategies designed to boost learners' working memory capacity were applied on a regular basis (3 months, once a week) with the experimental group seeking to determine their validity and appropriateness for the objective intended. It was not a simple process because it required thorough observation, theory confirmation, deep interpretation and understanding of the actual facts, behaviors and attitudes that learners displayed while developing the proposed boosting working memory capacity tasks.

It is important to highlight that much of the analysis was based on observing and interpreting students' real performance during the tasks' progression and development and also based on data gathered through field notes and checklists. Therefore, participant observation was of critical importance because it contributed to observe indicators of students' progress with regards to their working memory capacity and also it allowed to determine that those indicators did not occurred by any chance but as a direct result of the strategies designed to boost their vocabulary retention.

Based on the analysis of the questions posed in the survey, it can be interpreted that both groups knew and used a wide variety of techniques and strategies to attempt to memorize words studied in the English lessons. Even though the vast majority of them affirmed that their techniques were effective, the performance in various classroom tasks (role-plays, quizzes, tests, participation, reading comprehension) contradicted their assertion. It was hoped that after the implementation of the designed techniques in this research project, they became more aware of the many possibilities they have in order to retain L2 vocabulary in an organized way, that at the same time, are supported by researchers and language experts.

With regards to the analysis of the findings after applying the strategies proposed, it has to

be said that some strategies seemed to be more beneficial than others and that learners felt more confident with particular strategies and appeared to be inhibited in others, at some points in the process. Also, it has provided students with more confidence when participating since they are certain about the meaning of words that they are required to use in particular situations. This can be related to what Atkinson & Shiffrin (1968) stated in the sense that all the information that would eventually be stored in long-term memory, should necessarily go through short-term memory first.

Especially, the strategy N. 1, called *reducing the memory load*, which suggested decreasing the memory load by breaking down information and instructions and by providing them in multiple formats, was welcomed by most of students and offered a feasible technique to remember words to be retrieved afterwards. Also, strategy N.2, called *triggering learners' retention by color code*, which proposed the use of color as a way to help learners retain valuable information while being engaged in problem solving situations, facilitated in most students the retention of words being introduced. Relatedly, strategies N.3 *encouraging the use of memory aids*, N.4 *reinforcing learning preferences*, N.5 *clustering to encourage memory aids use* and N.6 *introducing advance organizers* were amongst the most successful strategies supported and validated by theories for boosting the retention and learning of English vocabulary. These data can be observed and confirmed in the charts, graphs and tables consigned in the result presentation section.

Furthermore, it can be claimed that most learners, 23 out of 28, were able to make significant gradual progress with regards to vocabulary retention during and after developing the strategies proposed and after providing them precise feedback on their general performance. It was also seen that there were students (5) still reluctant to the activities proposed and did not

make effort to be actively engaged in those. Similarly, there were introverted learners who had to be more involved in order to reach the desired goals.

It was also observed that most of the students had preference for certain the type of strategies that required them physical movement and written expression rather than those asking to understand oral information called *Fostering vocabulary retention by working on the phonological loop*. This can be attributed to the lack of training and exposure to listening tasks in previous courses and to the little familiarity with that sort of class procedures.

Besides, the composite of tasks designed favored not only vocabulary retention but also they were indirectly an ally of students' diverse learning styles and strategies. Also, it was noticed that visual learners encountered immense opportunities to potentiate their capacities and minimize their weaknesses due to the nature of some of the tasks carried out. Likewise, verbal and kinesthetic learners also had the chance to show their abilities and perform with security and determination. Consequently, most participants felt confident and committed to the tasks' completion since their learning preferences have broadly been taken into consideration.

Moreover, it was noticed that learners displayed a more positive attitude towards the course per se because their motivation seemed to have increased towards the L2 learning which could be seen in various signs such as risk-taking, participation without being asked, lowered anxiety about making mistakes, lowered inhibition and more confidence while providing oral answers and peer correction.

Nonetheless, negative impacts were also observed on those students who still cannot enhance their vocabulary retention becoming skeptic and somewhat frustrated to these learning tasks. Approximately, it can be said that 5 (17%) students particularly (3 males and 2 females) were not receptive to the strategies proposed during the class; they were carefully observed and

their performance was annotated. Although with not excellent outcomes, they preferred and kept demanding the implementation of traditional ways to learn L2 vocabulary such as isolated words memorization, mental and loud repetition and long word list drills. Additionally, they seemed not to be completely engaged during the tasks' development, they stepped back, looked indifferent and distracted, had little influence in the group dynamics and tended to feel frustrated and found the tasks as a waste of time and energy. This can connect to Gathercole and Alloway (2008) when claiming that distraction often appears when temporary information held in working memory is rapidly lost.

It is then necessary to continue working even closer with these learners so they consider implementing and using these new tasks for L2 vocabulary retention. Talking to them was a way to approach their apathy; however, they overtly said phrases such as: *"No profe, es mejor que nos de la lista de todas estas palabras nos las aprendemos y no gastamos tiempo"; "Igual me voy a olvidar de las palabras" and "La profe anterior nos hacía repetir en voz alta para aprender y así era mas fácil, yo apunto las palabras en Inglés y a lado la traducción en Español para aprendérmelas"*

In brief, it was noticed that learners benefited more from some activities than from others; they demonstrated a more active role in tasks that demand verbal, visual and kinesthetic performance whereas they did not yield outstanding results in the ones that required to be attentively listening to a series of words.

9. CONCLUSIONS

This study made it possible to come up with interpretations and conclusions in various different teaching and learning areas that have been classified according to their nature for a detailed understanding.

Conclusions related to the implementation of the strategies designed

In order to respond to the general objective of this research study**,** it is imperative to state that the most relevant conclusions drawn in this study are to be found in the implementation of the strategies to enhance learners' vocabulary learning by stimulating their working memory capacity. It can be determined that the boosting strategies 1. *Reducing the memory load*, 2. *Triggering learners' retention by color code*, 3. *Encouraging the use of memory aids*, 4. *Reinforcing learning preferences* and 5. *Clustering by the use of memory aids* were the most efficient techniques in making learners from the experimental group, remember best the vocabulary studied given the type of tasks and skills involved in their development. These strategies engaged learners by working on their visual and kinesthetic capabilities to retain vocabulary, by including physical movement, by testing their reading comprehension skills and by demanding a good performance in writing ones.

On the other hand, the strategies called *fostering students retention* designed to train students' working memory capacity by directly working on the phonological loop component, which involves recognition and retrieval of oral information, yielded results that were not totally satisfactory. It can be said that this is attributed to the students' lack of appropriate training in the listening skill and also to the scarce exposure to spoken language in previous English learning experiences. Besides, throughout the semester of this study, it was noticed that the learners' most

notorious weakness is the listening comprehension because they have difficulties to understand oral information heard in the target language. Consequently, the strategies that involved listening comprehension called *fostering students retention* posed most problems in most of the participants and the expected results were not totally visible. Therefore, the intention of enhancing learners' working memory through strategies involving listening comprehension require a different or more profound intervention in order to enhance their retention of L2 lexicon.

Conclusions related to learners' memory and retention.

It can be affirmed that the students from the experimental group displayed gradual and greater improvements in their retention capacity after incorporating the strategies compared to the students who belonged to the control group. This is observed when most participants from the experimental group, 23 to be precise, are able to retrieve, recognize and use the lexicon acquired from the strategies in other classroom tasks such as reading comprehension, oral discussions and participation, role plays, small debates and written compositions exercises.

Even though the control group showed minimal improvements in the post-test, those improvements can be interpreted as learning outcomes from a normal course without the direct intervention and training to the working memory capacity. Moreover, these improvements in the post-tests are not as significant as the improvements found in the experimental group, which did receive the direct intervention.

It can be concluded that if working memory capacity in L2 learners is trained and approached properly and frequently in the English classroom, there might be great learning outcomes that will eventually minimize learners' memory limitations and potentiate their retention abilities. It is also concluded that if ESL/EFL teachers become well aware of the effects

and the importance of implementing some boosting memory strategies, they can begin to integrate them into their daily pedagogical practice.

In a nutshell, the design, implementation and development of strategies may not solve all learning problems that the participants have or may have at some point but it contributes to strengthen a crucial element in L2 language teaching and learning, which is the working memory capacity, and that can be considered as a good start. Hence, it is a nonsense idea to yearn for different learning and language outcomes if the same processes are repeated over and over again.

Conclusions related to teaching implications

A remarkable conclusion refers to the fact that the implementation of these strategies can provide teachers with valuable opportunities to begin or keep incorporating the communicative approach, cooperative learning, lexical approach and multiple intelligences theory on a regular basis. Also, engaging learners in communication-oriented tasks helps them reach the goal of being communicatively competent and apart from contributing to make the English lessons meaningful learning experiences. Besides, it was concluded that the implementation of strategies turned into an alternative assessment technique since not only did the lessons implement tasks to enhance learners' capacity to retain new vocabulary but also they incorporated suitable alternatives to traditional assessment procedures. Then, the students had the chance to show their gradual progress by means of those tasks deviating from the frightening pop quizzes, tests or other traditional assessment tools. They also provided the teacher with various options to keep track of students' learning by observing how they interact in non-traditional classroom activities. Another possible asset of the strategies is that they allowed the teacher to give prompt feedback on the learners' performance during the activities as soon as they concluded.

Conclusions related to approaches observed

It can be understood that the implementation and execution of the strategies made the participants well aware of the wide range of alternate techniques through which they can train their capacity to hold information, in this case L2 word repertoire, for further retrieval when needed. Those alternatives are expected to help learners, not only in this study but also in further English courses, recall the necessary information, more specifically English vocabulary, when being required to interact either orally or written in the target language.

It was observed that learners displayed and established a sense of cooperation with their peers in order to accomplish the aims of the tasks proposed; they understood that when joining when forces and being responsible for a certain particular role within the group, the learning outcomes are achieved more effectively. Additionally, the strategies designed succeeded in engaging most learners' in more active and appealing class procedures that contributed not only to meet their initial objective but also to increase slightly the learners' motivation and enthusiasm towards the lessons. Since the strategies designed are not traditional ones they contributed to spark learners' desire and they became curious to those kinds of tasks. Likewise, they had the chance to potentiate their preferred learning styles and intelligences (verbal, visual, auditory, kinesthetic, etc.) and see whether not so preferred styles can also be beneficial.

Similarly, one of the specific objectives of this study was to engage learners in communicative tasks while implementing the strategies proposed. It can be stated that this objective was achieved in the sense that the implementation fostered authentic communication among learners since they could get involved in the development and completion of the tasks, other classroom activities such as role plays, discussions, brief oral presentations and also when they performed the task 3 in the post-test, which required students to play a character and act it

out in a specific situation.

Additionally, the fact that students have gained a greater L2 repertoire has provided them with more confidence to take part in oral and written communicative tasks in the classroom. It has allowed a considerable high percentage of learners to take risks and dare to participate more in class discussions. Therefore, a greater L2 lexicon has enabled them to focus on meaning rather than on form in class activities proposed where communication is the vehicle and the goal.

Similarly, there have also been indicators of gradual improvement with regards to vocabulary learning in the sense that students have begun to rapidly recognize, and more importantly, employ the words that were the core of the strategies during their implementation and development. The struggle to recall L2 words presented in previous lessons has been gradually minimized by directly working on the learners' working memory capacity through the strategies designed based on theory.

It would be relevant to highlight that this study took a small sample of L2 learners in a particular teaching and learning context. Consequently, these research findings should be looked at with caution for further implementation in EFL contexts. Besides, results might vary or the strategies herein proposed might yield diverse outcomes. However, the findings seem to broadly demonstrate positive effects on learners' working memory capacity and thus on L2 vocabulary learning.

10. RECOMMENDATIONS FOR FURTHER STUDIES

This study primarily sought to contribute to optimize the learning process of students by specifically providing strategies, tools and conditions to minimize learning difficulties to retain information and engage them in communicative and non-traditional class procedures.

Furthermore, this study found that there is considerable difficulty in the students' listening comprehension. Although listening comprehension was not measured in the pre and post-test, it was evidenced during the implementation and developing of the tasks that learners presented most problems when asked to hold aural information and process it afterwards. Thus, it is suggested to spend class time working on students listening skills. Few students had a successful performance in the tasks that required them to hear L2 words. Therefore, direct instruction in this language skill can be necessary.

With regards to further research on working memory, it can be recommended that the researcher implement technological tools and up-to-date software that can boost to a greater extent leaners' working memory. This way, computer-based working memory training can also increase students' memory capacity, thus enhancing learning.

Besides, there is a special intervention yet to be carried out with those apathetic learners who were reluctant to most of the tasks proposed. Their little interest can be tackled by implementing class procedures that tap directly into their learning styles and preferences; thus incorporating more multiple intelligences-oriented tasks.

Generally speaking, it can be recommended to implement these strategies permanently in order to contribute to enhance learners' capacity to retrieve and learn words presented in the English lessons; and this way, positive impacts on students' learning might be likely to take place gradually. Likewise, it is recommended the use of visual aids as vital classroom tools, since

learners can activate their capacity to remember words if colors are incorporated into the lesson

plans more frequently in further pedagogical practice.

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APPENDIXES

Appendix 1. Survey

SURVEY ON WORKING MEMORY CAPACITY – M.A TEFL MASTER'S REPORT – UNIVERSIDAD ICESI – DAVID MARTINEZ

GRACIAS POR TU COLABORACION EN ESTA PEQUEÑA ENCUESTA. DEDICA UNOS MINUTOS PARA COMPLETARLA. LA INFORMACION QUE TU PROPORCIONES SERA UTILIZADA PARA FINES NETAMENTE ACADEMICOS E INVESTIGATIVOS REFERENTES A LA ENSEÑANZA Y APRENDIZAJE DE IDIOMAS EXTRANJEROS.

RESPONDE LAS SIGUIENTES PREGUNTAS LO MAS SINCERAMENTE POSIBLE.

1. ¿Qué haces para retener y recordar información, conceptos, vocabulario en Inglés?

_____
_____
_____
_____
_____

2. En caso afirmativo en la pregunta 1, por favor describe brevemente la técnica que usas para aprender vocabulario en Ingles.

_____
_____
_____
_____
_____

3. Tienes resultados positivos con la técnica que describiste en la pregunta 2?

_____
_____
_____
_____
_____

MUCHAS GRACIAS

Appendix 2. Pre-test and Post-test

TASK 1: THE WRIGHT BROTHERS - MEN WITH A VISION

Warm-up Do you like traveling by airplane? Why or why not? 2. What are the names of some famous inventors? 3. What are some famous national / International airlines?

A. Read the next passage and focus your attention on the irregular verbs

Did You Know?

The Wright brothers never married. Their only love was aviation.

Wilbur Wright, 1867–1912; Orville Wright, 1871–1948

Over 100 years ago, people only dreamed about flying. The Wright brothers, Wilbur and Orville, were dreamers who changed the world.

Wilbur Wright was born in 1867 and Orville was born in 1871. In 1878, they received a paper flying toy from their father. They played with kites and started to think about the possibility of flight.

When they were older, they started a bicycle business. They used the bicycle shop to design their airplanes. They studied three aspects of flying: lift, control, and power. In 1899, they constructed their first flying machine—a kite made of wood, wire, and cloth. It had no pilot. Because of wind, it was difficult to control. They continued to study aerodynamics.[1] Finally Wilbur designed a small machine with a gasoline engine. Wilbur tried to fly the machine, but it crashed. They fixed it and flew it for the first time on December 17, 1903, with Orville as the pilot. The airplane remained in the air for twelve seconds. It traveled a distance of 120 feet. This historic flight changed the world. However, only four newspapers in the U.S. reported this historic moment.

The Wright brothers offered their invention to the U.S. government, but the government rejected[2] their offer at first. The government didn't believe that these men invented a flying machine. Finally, President Theodore Roosevelt investigated their claims and offered the inventors a contract to build airplanes for the U.S. Army.

December 17, 2003, marked 100 years of flight. There was a six-day celebration at Kitty Hawk, North Carolina, the location of the first flight. A crowd of 35,000 people gathered to see a replica[3] of the first plane fly. The cost to re-create the plane was $1.2 million. However, it rained hard that day and the plane failed to get off the ground.

You can now see the Wright brothers' original airplane in the Air and Space Museum in Washington, D.C.

B. Fill in the blanks with a suitable verb from the text about the Wright Brothers.

1. The Wright Brothers _____ with kites as children.
2. They _____ about flying
3. They _____ everything they could about flying
4. They _____ a bicycle business
5. They _____ the bicycle shop to design airplanes
6. They _____ to fly their first plane in 1899.
7. Their first plane _____ but then They _____ it.
8. In 1903, their plane _____ in the air for 12 seconds
9. They _____ their invention to the U.S government.
10. The government _____ to offer them a contract.
11. Wilbur Wright _____ in 1912.
12. Orville Wright _____ for many more years.
13. Their invention definitely _____ our world.

C. Check your overall understanding by circling the correct option

1. You are not able to see the original plane in a museum in Washington, DC.	a. True b. False
2. South Carolina is the place where the first flight occurred.	a. True b. False
3. The U.S Government rejected the first brothers' invention.	a. True b. False
4. A great number of U.S newspapers reported this event.	a. True b. False
5. In 1878, the brothers received a paper-made toy from his father.	a. True b. False

TASK 2: ROBERT GODDARD –
AN INCREDIBLE MAN

Warm-up 1. Did you ever see the first moon landing in 1969? **2.** Are you interested in astronauts and rockets? **3.** Is the astronauts' job interesting?

A. Read the next passage and focus your attention on the irregular verbs

Robert Goddard with early rocket, 1926

Robert Goddard was born in 1882. When he was a child, he became interested in firecrackers and thought about the possibility of space travel. He later became a physics professor at a university. In his free time, he built rockets and took them to a field, but they didn't fly. When he went back to his university after his failed attempts, the other professors laughed at him.

In 1920, Goddard wrote an article about rocket travel. He believed that one day it would be possible to go to the moon. When *The New York Times* saw his article, a reporter wrote that Goddard had less knowledge about science than a high school student. Goddard wanted to prove that *The New York Times* was wrong.

In 1926, he built a ten-foot rocket, put it into an open car, and drove to his aunt's nearby farm. He put the rocket in a field and lit the fuse. Suddenly the rocket went into the sky. It traveled at 60 miles per hour (mph) to an altitude of 41 feet. Then it fell

Astronaut Buzz Aldrin of Apollo 11 on the moon, 1969

into the field. The flight lasted 2½ seconds, but Goddard was happy about his achievement. Over the years, his rockets grew to 18 feet and flew to 9,000 feet in the air. No one made fun of him after he was successful.

When Goddard died in 1945, his work did not stop. Scientists continued to build bigger and better rockets. In 1969, when the American rocket Apollo 11 took the first men to the moon, *The New York Times* wrote: "The Times regrets[6] the error."

Did You Know?

The first woman in space was a Russian, Valentina Tereshkova, in 1963.

B. Fill in the blanks with the past tense of one of the words from the box below

FLY THINK SPEAK DRIVE BE FALL BUY WRITE PUT BECOME SEE

1. Goddard _____ interested in rockets when he was a child.

2. He _____ a professor of physics.

3. People _____ that space travel was impossible.

4. Goddard _____ his first rocket in a car and _____ to his aunt's farm

5. The rocket _____ for 2 ½ seconds and then it _____ to the ground.

6. Goddard never _____ the first moon landing.

7. The New York Times _____ about their mistake 49 years later.

C. Unscramble the words and create a grammatically correct sentences

1. The suddenly sky fell into rocket the

2. *New York Times* the wanted to he that prove wrong was

3. No him one was fun of made successful he after

4. became He at professor later a university a physics

5. An took American first moon the to rocket men the

C. *Speaking Activity*

You will be given a card with a role-play that you will perform with your classmates. Do take into account *the verbs and the vocabulary* of the previous exercises. ☺

Imagine that you are an important journalist in 1899. Your task is to create a list of interesting questions and interview the Wright brothers by asking them about their creation, previous experiences and general impressions.

Imagine you are one of the Wright Brothers. An important journalist or the U.S president will interview you about your recent creation, experiences and general impressions. Your task is to anticipate the possible questions of the president/journalist.

Imagine you are the U.S president Theodore Roosevelt, and you are going to ask the Wright Brothers about their flying invention. Create a list of questions

Imagine that you are an important journalist from the New York Times. Your task is to create a list of interesting questions and interview Robert Goddard by asking them about their creation, previous experiences and general impressions.

Imagine you are one Robert Goddard. An important journalist or the U.S president will interview you about your recent creation, experiences and general impressions. Your task is to anticipate the possible questions of the journalist.

Appendix 3. Checklist

INDICATORS OF WORKING MEMORY CAPACITY CHECKLIST

INDICATOR	Poor	Fair	Good	Excellent	Learner: _____
Task completion					
Task Engagement					
Instructions Understanding					
Attention span					
Listening comprehension					
Reading comprehension					
Access to previous knowledge					
Grasp of new vocabulary					
Remembering procedures					

Appendix 4. Strategy 1

STRATEGIES TO BOOST WORKING MEMORY CAPACITY: **TASK ONE**
OBJECTIVE: Reduce the memory load
TIME: 1 HOUR

- Break tasks and instructions down into smaller steps. If possible, assign one task at a time.
- Keep new information or instructions brief and to the point, and repeat them for the student if needed
- Provide written directions for reference.
- Increase the meaningfulness of the material by choosing material that is relevant for learners.
- Provide information in multiple ways: speak it, show it, and create opportunities to physically work with it or model it.

Instructions to be printed out and glue to the board so students can observe them clearly:

1. Fill in the blanks with the right forms of the verbs IN PAST
2. Organize short story in a logical order
3. Once the story is organized, provide a tittle
4. Create a similar story with the verbs given and present it to the class (120 words)

Slides of papers to be cut out and given to a group of four students

---
DRINK - SIT – EAT- ASK - TASTE
They _____ down in a table and they _____ some strange food. Jimmy _____ a glass of fruit juice. It _____ very good so he _____ for another glass

---
HAVE - WATCH - PLAY - TALK - GO - SWIM
In the afternoon they _____ football, _____ the nature and _____ in the river. They _____ no a TV set, so after dinner they _____ and then they _____ to sleep.

LOOK - HEAR - BE - INVITE – SEE - MEET - BE
One night, they _____ by the river watching the moon. Suddenly, they _____ someone calling "Hello! Hello!" They _____ around and they _____ a very strange creature. It _____ green and very small. He _____ them to go to his spaceship. In that place, they _____ other strange creatures and a beautiful princess

---
LOOK - FEEL - BE - OPEN - BE - BECOME
After some minutes, he _____ a bit strange. Oh, dear…he _____ green and small like the others. The princess _____ not beautiful anymore and she _____ horrible. What was happening? He _____ his eyes and … what a relief! It _____ only a dream!

WAKE UP - BUY - GO - SPEND - GO - NEED
Last Easter holidays Jimmy and Paul _____ camping in the mountain. They _____ a wonderful time there. They _____ early in the morning and then they _____ for a walk. In the village, they _____ everything they _____.

Appendix 5. Strategy 2

STRATEGIES TO BOOST WORKING MEMORY CAPACITY: **TASK TWO**
OBJECTIVE: Trigger learners' retention by Color Code
TIME: 45 Minutes

- Physical coding, such as consistent colors for different subject areas, can help students remember information.
- Try coding when teaching new concepts: when teaching sentence structure nouns are always red, verbs are always green etc.
- Vocabulary: teach new words in categories or families and color code the categories.

The students will be given these words (verbs in red and nouns in green) from the previous pre-test activity at the beginning. These words will be printed out and cut individually for them to touch them and interact with them

Then, they will have to match meanings / translation. Next, they will memorize them by challenging their classmates about their meanings in English and Spanish.

PILOT	KITE	FLIGHT	MACHINE	MUSEUM
GOVERNMENT	WIND	SHOP	ENGINE	WORLD

PILOTO	MUNDO	MOTOR	VIENTO	GOBIERNO
MUSEO	TIENDA	VUELO	MAQUINA	COMETA

DESING	REMAIN	BELIEVE	INVENT	OFFER
HAVE	CRASH	GATHER	REJECT	FIX

PERMANECER	INVENTAR	COCHAR	ARREEGLAR	TENER
RECHAZAR	UNIR	OFRECER	CREER	DISEÑAR

After that, the next activity consists on having the students listen to a recording in which some of the words above will be pronounced. In small groups, they will have to translate the words heard into Spanish. The group that has most correct participations will have a reward.

The next step is to play a "Concentrece" game in which all these words will be displayed. The students will have to visualize the English words and their Spanish equivalent translation. Volunteers will come forward and participate freely as the rest of the class roots for them. In this case, they will be paying attention to meaning and position.

MUNDO	WIND	TIENDA	GATHER
VIENTO	FLIGHT	DISEÑAR	MOTOR
DESIGN	SHOP	BELIEVE	WORLD
COMETA	UNIR	HAVE	VUELO
CREER	ENGINE	TENER	KITE

Appendix 6. Strategy 3

STRATEGIES TO BOOST WORKING MEMORY CAPACITY: **TASK THREE**
OBJECTIVE: Encourage the use of memory aids
TIME: 1 HOUR

• Use visual posters; create posters of commonly used words.
• Give instructions through written material. it could be a handout, whiteboard, or simply a sticky note.
• Encourage the use of checklists for multi-step tasks (e.g., steps for editing written work, timelines for assignments).
• Use graphic organizers to teach new concepts and information.

Students will create posters of the following verbs and then they will write as many sentences as they can including the verb, they can also include images or drawings.

LAUGH
GO
THINK
HAVE
GROW

TAKE
FLY
MAKE
FALL
SEE

ROCKET
ATTEMPT
NEARBY

WRONG

FIRECRACKERS
KNOWLEDGE
SUDDENLY
FARM

THINK
I always think of you.
Thinking before saying
Think twice
I don't think so!
I think so!

LAUGH
We like to laugh in class.
My parents do not laugh at lunch.
Laughing is good for your health.

I never laugh at his jokes
She always laughs in Math class.
Laughing is a good exercise.

FIRECRAKERS

KNOWLEDGE

Knowledge is power
Always seek knowledge
Imagination is more important than knowledge

Appendix 7. Strategy 4

STRATEGIES TO BOOST WORKING MEMORY CAPACITY: **TASK FOUR**
OBJECTIVE: Reinforce learning preferences (socrative)
TIME: 10 MINUTES

The use of this strategy is intended to encourage self-reflection for the teacher and the student and determine what actually worked for them.

Socrative is a classroom technology-based technique through which teachers can observe students' level of comprehension and understanding of a certain grammar component or any other class objective by means of a different way. Most students feel embarrassed when providing answers to the whole class even if they do know the correct answer; they feel on the spot where their anxiety increases rapidly. As the activity is done, the teacher has a pretty good idea of student understanding of the topics and content studied and revised.

The manager _____ his employees for a last minute meeting.

A	bought
B	worked
C	gathered
D	read

SUBMIT ANSWER

My siblings and I _____ with _____ when we were very young.

A	played - kites
B	spoke - clouds
C	played - neighborhoods
D	write - poems

SUBMIT ANSWER

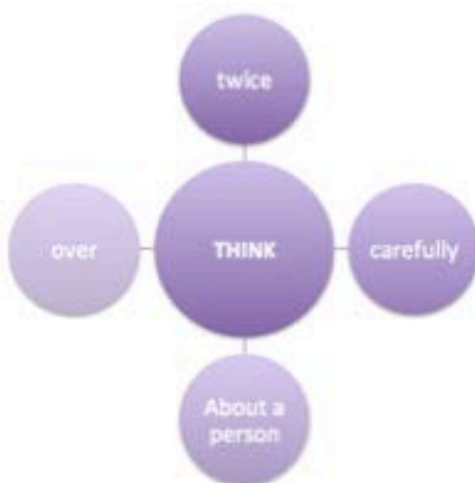**Appendix 8. Strategy 5**

STRATEGIES TO BOOST WORKING MEMORY CAPACITY: **TASK FIVE**
OBJECTIVE: Encourage the use of memory aids by clustering
TIME: 1 HOUR

Have students make lists of reminders regularly by using graphic organizers to teach new concepts and information and retrieve them more easily afterwards. They will use boards to draw their clusters and will explain them to the whole class.
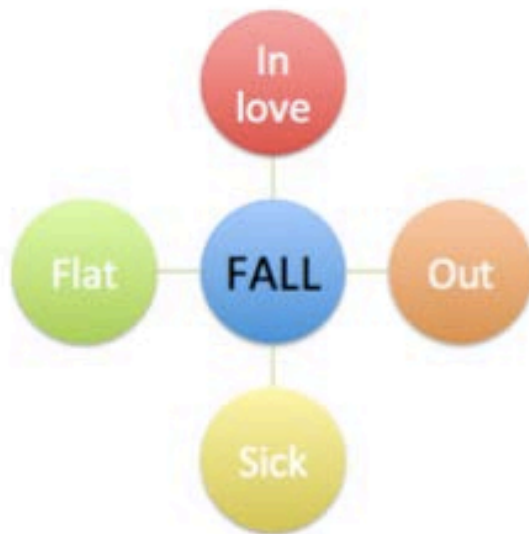
Appendix 9. Strategy 6

STRATEGIES TO BOOST WORKING MEMORY CAPACITY: **TASK SIX**
OBJECTIVE: Introduce advanced organizers
TIME: 1 HOUR

KWL charts (What I Know, What I Want to Know, What I Learned) are a graphic organizer that helps students focus on what is to be learned. This tool. The students will be asked to fill out the chart above before the class and after to encourage them activate prior knowledge, to help generate questions to explore and to connect new knowledge to what they already know.

NAME: _____ CLASS TOPIC_____ DATE: _____

	WHAT I KNOW	WHAT I WANT TO KNOW	WHAT I LEARNED
I ENJOY LEARNING ENGLISH HERE!!			

Appendix 10. Strategy 7

STRATEGIES TO BOOST WORKING MEMORY CAPACITY: **TASK SEVEN**
OBJECTIVE: Foster vocabulary retention by working on the phonological loop
TIME: 35 MIN
* Activity and material adapted from *New Total English- Starter Student's Book. Pearson*.

Students will listen several times to a group of words without seeing them and without knowing their meaning trying to memorize as many as they can. Then, they will be required to repeat them loud. Next, the teacher will hand over the words in pieces of paper and they will have to organize them in the order that they heard previously and check the meaning with the guidance of the teacher. Then, they will be shown a set of pictures to which they have to match the words heard before. Finally, they will be asked to describe a famous person/place by employing the words learned and the rest of the class will have to guess the person talked about.

attractive dark fair fat old overweight
short slim tall thin ugly young

airport beach gallery lake market mountain
museum national park palace river the sea
theatre

Appendix 11. Strategy 8

STRATEGIES TO BOOST WORKING MEMORY CAPACITY: **EIGHT**
OBJECTIVE: Foster vocabulary retention by working on the phonological loop
TIME: 35 MIN
* Activity and material adapted from *Tactics for Listening Second Edition. Oxford*

This activity attempts to have students retain a series of spoken information in order to retain it for a short time and then perform certain tasks based on the information previously heard. In this opportunity students will listen to a couple of physical features and basic clothing vocabulary to identify the character that is being described in the recording. This image will be projected onto a large screen so learners can carry it out properly. After this chart is fill, the students will be required to come up with a description of a classmate without revealing his/her name so the rest of the class guesses that classmate. A similar procedure will be done with the vocabulary regarding food and cutlery for future classes.
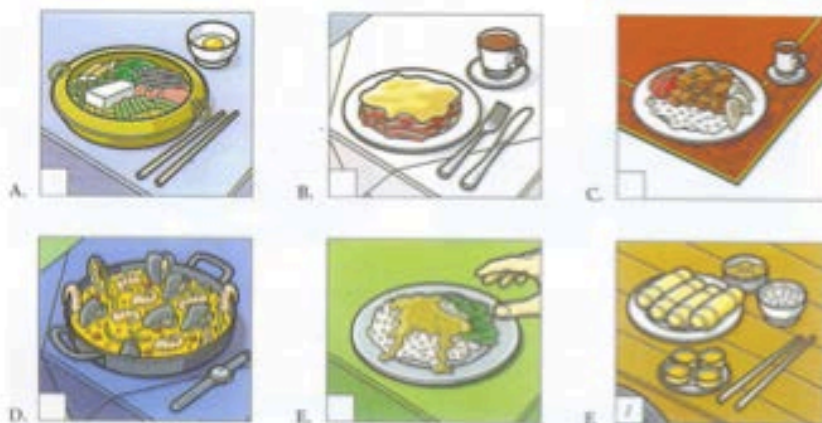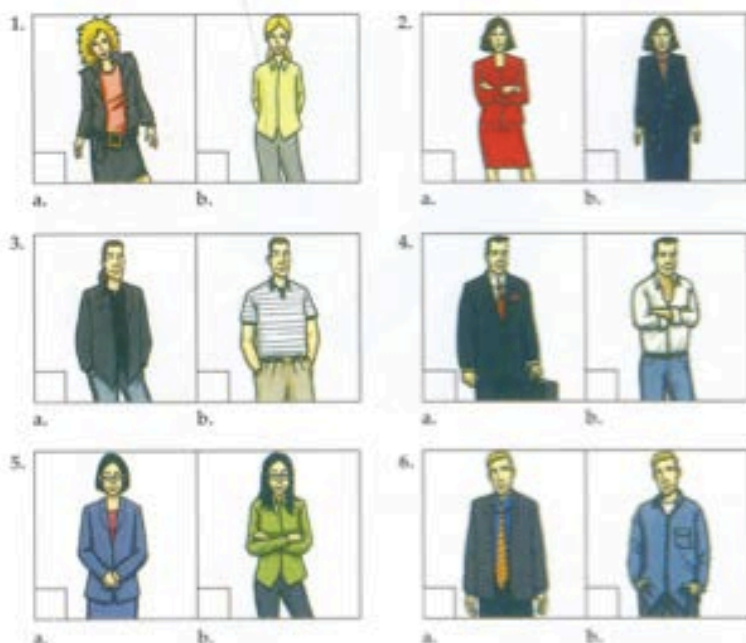
Appendix 12. Strategy 9

STRATEGIES TO BOOST WORKING MEMORY CAPACITY: NINE
OBJECTIVE: Foster vocabulary retention by working on the phonological loop
TIME: 20 MIN
* Activity and material adapted from *New Total English- Starter Student's Book. Pearson.*

This listening task seeks to make learners more sensible to speech-based information and retain it for a short time. Once retained, the info will be used to perform a simple further task, thus working on students' phonological loop and directly their working memory capacity as well. more precisely to past simple ED pronunciation and some vocabulary related to this grammatical component.

First, they will be given this chart with some missing words, then a recording with a sequence of 3 sentences will be played so they can find the place where the missing words fit into. Anotherthree sentences will be played too until they complete the whole chart.

① We ____ in a big house.	② I _____ to some music.	③ He started a new ____ .	④ You ____ the film.
⑤ I ____ the Internet.	⑥ We cleaned our ____ .	⑦ She studied for ____ hours.	⑧ They worked all ____ .
⑨ He ironed his ____ .	⑩ They cleaned the ____ .	⑪ We ____ the book.	⑫ I tidied the ____ .
⑬ She washed her ____ .	⑭ We _____ television.	⑮ I ____ my friends.	⑯ You ____ at home.
⑰ They finished work at ____ .	⑱ He ____ a new car.	⑲ I called my ____ .	⑳ We played ____ .

Appendix 13. Strategy 10

STRATEGIES TO BOOST WORKING MEMORY CAPACITY: **TEN**
OBJECTIVE: Foster vocabulary retention by working on the phonological loop
TIME: 25 MIN

BINGO GAME

As a follow-up activity, learners will practice past tense through a bingo game by actively listening to the verbs called out by the teacher. In pairs or individually, they will be given several Call Cards with different present and past verbs to be recognized and covered. This task is intended to provide aural practice and make students more sensitive to speech-based information.

Past Tense Bingo – Call Cards

take	see	GO	say	get	EAT
HAVE	FEEL	write	buy	come	think
do	be	make	give	wear	DRINK

took	saw	went	said	got	ate
had	felt	wrote	bought	came	thought
did	was/were	made	give	wore	drank

FELt	wore	thought
made	WENT	came
DRANK	saw	wrote

took	got	said
saw	HAD	came
was	did	WENT

said	DRANK	made
bought	took	wore
WENT	got	ATE

Appendix 14. Ethical Letter

Doctor:

Edmundo Mora

Jefe Departamento Lingüística e Idiomas

Universidad de Nariño

Cordial Saludo,

Me dirijo a usted para solicitarle respetuosamente me conceda el permiso de llevar a cabo mi investigación del proyecto de grado de maestría en la Universidad ICESI – Cali, titulado *HOW CAN WORKING MEMORY TRAINING ENHANCE ENGLISH VOCABULARY LEARNING?* con el grupo de Enfermería Inglés 3 grupo 24 y recolectar los datos e información necesaria para tal fin. Al final del proceso de investigación estaría muy complacido de presentarle formalmente los resultados del proyecto.

Agradeciendo su atención y tiempo, me despido de usted.

David Martinez

Docente Departamento de Idiomas

Universidad de Nariño

Appendix 15. Observation - field notes

Observation 6
Task 7
Field Notes

- Ss have trouble remembering what they hear
- Some have problem with the pronunciation.
- In a list of 6 words, they tend to retain 4.
- The recording had to be played several times (more than I expected) So they could remember

- They could organize up to 5 words with the pieces of paper
- The matching word-picture activity was easier if they knew the meaning or asked me.
- Good oral production of the words.
  Listening part: !! Organizing / Speaking

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Observation 7
Task 8
Field Notes

- Most of Ss have difficulty recognizing the words played correctly. So I needed to play
- the recording several times so they could identify the character being described.
- but, they have a good time figuring out the precise description. Some words heard were used in the follow-up task of describing a classmate. Several Ss lost interest because they could not get the words played. It has to be revised to have better results !!

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Observation 8   Task 9   Field Notes.

- Ss are very attentive to listen to the 3-word sequences.
  They still have to ask for more repetitions of the recording to retain the words
- Ss feel engaged when listening and completing. They look motivated to this type of listening task. (more active)
- Small groups work better. All Ss look eager to complete the chart yet. involved.
  This type of active listening fosters cooperation, motivation and class dynamics.

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Observation 5
Task 5
Field Notes

After receiving the class, students choose the words that they remember most and create graphic organizers. They enjoy the activity (laughs, cooperation and enthusiasm) they follow instructions easily and develop the activity with commitment. Although, some Ss tend to note down the words and participate less. They choose words that were important and new for them

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Observation 2
Task Two

Field Notes

- Ss display engagement during the activity
- matching activity is appealing to them
- Some groups discovered green = nouns / red = verbs
- they still ask for the meaning of some words.
- Ss are motivated (some) while performing the contest.
- they tend to hear the words faster / recognize
- 1 student per group seems to lose attention.
- when they listen, they discourage if not catch the words
- "Concentece game is a total success
  - Ss feel active   - shouts
  - Not stressed   - Energy
  - able to remember words. enthusiasm
                            - distraction

Observation 4
Task 4.

Field Notes

the use of sonative software to check Ss
learning is Seen as a new way by the Ss.
They feel not so nervous
Results = 75% students got a passing
          25% failed the test.   grade
Feedback to be delivered next class

Observation 3
Task 3

Field notes

Ss seem to enjoy the activity.
As usual there are some Ss who lose
interest as the activity develops. they move aside
I try to encourage them to get involved.
Final results are great   Ss Enjoy moving,
working on the floor, coloring, and the
use of the words are correct most of the
times.

Observation 1
Task 1
Field Notes

- Ss find it easier to see instructions on
  the board. (following instructions
- They ask fewer questions
  Questions on some verbs. · eat
- Ss help each other in their groups
  all seem to be involved, Some are not involved
- Motivation to Finish
- Cooperation / Team work while organizing
- Finding a title is hard in most groups
- Ss (some) lose attention and interest
· Stories creation took most time (longer than expected
· Good stories while socializing to the group
· good general impressions, verbs got!
I needed more time!

Appendix 16. Observation - Checklists

Group: 2 Task 9

INDICATOR	Poor	Fair	Good	Excellent	
Task completion	✓				
Task Engagement		✓			all participated. engaged.
Instructions Understanding		✓			
Attention span	✓				feded away. !!
Listening comprehension		✓			listening problems
Reading comprehension					
Access to previous knowledge	✓				no retrieval
Grasp of new vocabulary	✓				poor
Remembering procedures		✓			OK.

INDICATORS OF WORKING MEMORY CAPACITY CHECKLIST

Group: 5 — Task 5

INDICATOR	Poor	Fair	Good	Excellent	
Task completion		✓			done!
Task Engagement		✓			all were engaged
Instructions Understanding			✓		
Attention span				✓	excellent until the end.
Listening comprehension					
Reading comprehension			✓		ok ✓
Access to previous knowledge			✓		
Grasp of new vocabulary		✓			not all the words.
Remembering procedures			✓		

Group: 6 Task 10

INDICATOR	Poor	Fair	Good	Excellent	
Task completion				✓	all completed
Task Engagement				✓	
Instructions Understanding				✓	great
Attention span				✓	great
Listening comprehension			✓		
Reading comprehension					
Access to previous knowledge				✓	some question though
Grasp of new vocabulary			✓		
Remembering procedures				✓	no need to repeat

INDICATORS OF WORKING MEMORY CAPACITY CHECKLIST

Group: 4 Task 6

INDICATOR	Poor	Fair	Good	Excellent	
Task completion				✓	all contributed
Task Engagement				✓	
Instructions Understanding			✓		
Attention span			✓		
Listening comprehension			✓		
Reading comprehension					
Access to previous knowledge			✓		
Grasp of new vocabulary			✓		most words
Remembering procedures				✓	all steps retained

INDICATORS OF WORKING MEMORY CAPACITY CHECKLIST

Group: 3 - Task 2

INDICATOR	Poor	Fair	Good	Excellent	
Task completion				✓	Finished before !
Task Engagement			✓		all cooperated
Instructions Understanding			✓		
Attention span			✓		
Listening comprehension					
Reading comprehension			✓		
Access to previous knowledge			✓		
Grasp of new vocabulary			✓		
Remembering procedures			✓		

INDICATORS OF WORKING MEMORY CAPACITY CHECKLIST

Group: 1 - Task

INDICATOR	Poor	Fair	Good	Excellent	
Task completion			✓		time constraints
Task Engagement				✓	
Instructions Understanding			✓		nice
Attention span				✓	
Listening comprehension		✓			
Reading comprehension			✓		
Access to previous knowledge			✓		
Grasp of new vocabulary				✓	good
Remembering procedures				✓	

INDICATORS OF WORKING MEMORY CAPACITY CHECKLIST

Group: 4 Task 8

INDICATOR	Poor	Fair	Good	Excellent	
Task completion			✓		almost, final
Task Engagement			✓		nice
Instructions Understanding				✓	
Attention span				✓	faded away
Listening comprehension			✓		Not bad
Reading comprehension					
Access to previous knowledge			✓		
Grasp of new vocabulary			✓		
Remembering procedures		✓			poor attention

Group: 3 Task 3

INDICATOR	Poor	Fair	Good	Excellent	
Task completion				✓	good
Task Engagement				✓	
Instructions Understanding				✓	
Attention span			✓		faded away at the end
Listening comprehension					
Reading comprehension				✓	
Access to previous knowledge				✓	
Grasp of new vocabulary				✓	awesome!
Remembering procedures				✓	