# THE ROLE OF MEMORY IN FOREIGN LANGUAGE LEARNING AND ACHIEVEMENT

## Rahmouna ZIDANE[1]

**Abstract:** Foreign language learning is a complex process that involves cognitive, physiological, psychological and social mechanisms. It is based on the acquisition and the accumulation of knowledge throughout time. In fact, information processing is related to mental processes including memory whose main task is represented in the act of remembering information which is an essential element in successful foreign language learning. The present article attempts to explain the role of human memory in foreign language learning and achievement. It investigates the learning difficulties associated with memory to propose some strategies that can enhance memory capacity. The study consists of two main parts. The first one is theoretical represented in the description of the history of research within the field of foreign language learning and instruction with special reference to the theories related to memory. It provides an explanation of the memory system, its distinct types and its main models. Then, it tackles its position in foreign language learning within the different learning theories and language teaching methods. The second part is practical; it tries to elicit the relationship between human memory and foreign language learners' performance through the study of the case of first year EFL university students using a test as a research instrument. Finally, the article ends with a set of suggestions formulated on the basis of the research findings.

**Keywords:** Foreign Language, Learning, Human Memory, Knowledge.

### YABANCI DİL ÖĞRENİMİNDE VE BAŞARIDA HAFIZANIN ROLÜ

**Öz:** Yabancı dil öğrenimi bilişsel, fizyolojik, psikolojik ve sosyal mekanizmalar içeren karmaşık bir süreçtir. Genellikle dil öğreniminde başarı, bilgi edinimi ve birikimine dayanmaktadır. Aslında, bilgi süreci zihinsel işlemlerle bağlantılıdır ve ana görevi bilgileri depolamak olan ve dil öğreniminde önemli bir yere sahip olan insan hafızası bu işlemlerden biridir. Bu makalede, yabancı dil öğreniminde ve başarıda hafızanın etkisinin ve yabancı dil öğrencilerinin bellek kapasitesi nedeniyle

499

[1] Dr., Tlemcen Üniversitesi, Edebiyat Fakültesi, İngiliz Dili Bölümü. mouna_zde@yahoo.com

karşılaştığı zorlukların incelenmesi amaçlamaktadır. Araştırma kapsamında, hafıza kapasitesini geliştirmek için bazı stratejiler listelenmiştir. Bu çalışma, teorik ve pratik olarak iki bölüme ayrılmıştır. İlk kısımda, hafıza sistemi, farklı türleri ve ana modelleri tarif edilmiştir. Ayrıca, bellek özel referansı ile öğrenme kuramları ve öğretim yöntemlerinden bahsedilmiştir. Pratik kısımda bu inceleme vaka çalışması olarak üniversite yabancı dil öğrencileri üzerinde uygulanmıştır. Hafıza ve öğrencilerin performansı arasındaki ilişkiyi açıklamak için farklı görevler içeren yazılı test kullanılmıştır. Toplanan verileri analiz etmek için tanımlayıcı istatistiklerden yararlanılmıştır. Böylece, çalışmanın hipotezleri kanıtlar sağlanarak onaylanmıştır. Daha sonra, yapılan bir araştırmada bellek etkisi ve öğrencilerin performansı hakkında diğer araştırmacıların görüşlerine yer verilmiştir. Elde edilen sonuçlar ışığında öğrencilerin hafıza kapasitesini geliştirmek ve düzeylerini iyileştirmek amacıyla onlara faydalı olacak öneriler sunulmuştur. En sonunda, yabancı dil öğrenmede başarı ya da başarısızlığa neden olan faktörleri saptamak için daha fazla araştırma yapılması gerektiği sonucuna varılmıştır.

**Anahtar Sözcükler:** Yabancı Dil, Öğrenme, İnsan Hafızası, Bilgi.

## Introduction

Research about human memory has a long history. Aristotle, the Greek philosopher, attempted to explain the relationship between memory and learning. In the 19th century, Wilhelm Wundt studied mental processes and launched the first study of memory leading to assumptions about remembering. By the beginning of the 20th century, Gestalt *Psychologists* highlighted the effect of the context on memory encoding and retrieval of information. The British psychologist, Frederick Bartlett, explained how memory relies on meaningful material. In fact, real research about memory started in the 1950's (Scott, 2007). By the 1980's, some researchers studied the relationship between memory and second language acquisition (O'malley & Chamot, 1990). By the 1990's, research concerning the impact of memory on foreign language learning and performance witnessed a great development. This issue, which represents the core of the present article, will be highlighted in the following sections. Before doing so, an explanation of the meaning of memory is provided as a prelude to the research work.

## 1. Human Memory

The memory system involves three stages: encoding, storage and retrieval. Encoding refers to the stage of registering and processing information. Storage means to hold and maintain data in order to use them later. Retrieval implies recall or recognition of data. Recall refers to the reconstruction of information; recognition means making a decision about whether an item was encountered before (Baddeley, 2004; Coon & Mitterer, 2009). Consequently, the process of memory is based on several subsystems including different kinds of memories. The main types of memory systems are sensory memory, short-term memory (STM) and long-term memory (LTM).

Sensory memory which is also called perceptual memory is considered as part of perception. It receives input from all the senses (Scott, 2007). It is the first stage of memory that encodes information and retains them for two seconds. Then, it transfers them to the short-term memory (Coon & Mitterer, 2009). If data are not transformed to the second type of memory systems, they fade quickly.

Short-term memory which is also called temporary memory holds small amounts of information for few seconds. There are two types of temporary memory: immediate and working memory. Immediate memory retains data for 30 seconds. If the input is not important, it is dropped out of the memory (Sousa, 2005). However, when the data are valuable, they are rehearsed in order to be stored in the long-term memory (Scott, 2007). On the other hand, working memory is related to cognitive processes involving reasoning, thinking and problem solving; it can hold information for a limited period of time; if data are important, they are transferred to long-term memory which is also called permanent memory as it stores information for a long period of time (Westwood, 2004). Long-term memory includes recent and older facts. It is divided into explicit and implicit memory.

Explicit memory is also referred to as declarative memory (Baddeley, 2004); it involves long-term stored information related to events, activities done by the person and the knowledge of the world. Explicit memory is linked to declarative knowledge. It is divided into two kinds of memory systems: episodic and semantic memory. Episodic or autobiographical memory refers to the human ability of remembering events, time and places. Semantic memory is related to the knowledge of the world and society. On the other hand, implicit memory which is also called non-declarative memory "…refers to our ability to recall the steps in a particular process, skill or strategy" (Westwood, 2004, p.42). It includes two types of memory pathways: procedural and reflexive memory. Procedural memory which is referred to as motor memory or habit memory is responsible for physical skills; reflexive memory is linked to automated and unconscious learning (Jensen, 1998). Implicit memory is related to procedural knowledge (Baddeley, 2004). Hence, it concerns the procedures of learning skills that will become automatic such as driving a car or the acquisition of the mother tongue. In fact, the variety of memory types led to the elaboration of different memory models.

## 2. Models of Memory

A model of memory refers to the representation of its organization and functions. The most popular models of memory are: the multi-store, the levels of processing and the working memory model.

### 2.1. The Multi-Store Model

This model was proposed by Waugh and Norman in 1965; it involved two types of memory: primary and secondary. Primary memory perceives information that will be forgotten if they are not rehearsed. However, the rehearsal of data

permits to retain them in the primary memory or to transfer them to the secondary memory. In 1968, the Waugh and Norman model was developed by Atkinson and Shiffrin who proposed that memory system relies on three components: sensory register, a short term store and a long term store (Scott, 2007). Therefore, the multi-store model highlights the necessity of attention and rehearsal for the process of transferring and remembering data.

## 2.2. The Levels of Processing Model

In 1972, Fergus Craik and Robert Lockhart proposed the levels of processing model which represented a series of levels involved in encoding and processing information. It links the processing and storage of information to the act of understanding items. This model considers the task of memory as a process involving two levels. The first level refers to shallow cognitive processing which relies on maintenance rehearsal of information that happens through the recognition and repetition of items. The second level which is called deep cognitive processing is embodied in elaborative rehearsal which implies the recognition, understanding and processing of information (Moxon, 2000). Hence, this model turns around the depth of knowledge.

## 2.3. The Working Memory Model

This model was proposed by Baddeley and Hitch in 1974 to prove that the short term memory embodies a set of different stores processing various types of data simultaneously while dealing with a specific task (Scott, 2007). The working memory model refers to the act of handling several memory tasks at the same time. One can conclude that these memory models highlight the effect of attention, repetition and comprehension on the acquisition of knowledge; they may provide insights into the ways of improving foreign language learning and instruction.

## 3. Memory and Foreign Language Learning

Research about language learning and teaching has a long history. In the 4th century B.C, Plato formulated ideas concerning the relationship between education and psychology. These ideas were developed by Aristotle into the faculty psychology theory which views the mind as the seat of learning and gives importance to the role of the intellectual process in education (Chauhan, 1978). This theory is the basis of the mental discipline approach to learning which views that teaching school subject-matters via memorization is a way of educating the mind (Clarke, 2003). It dominated the period lasting before and during the 19th century.

This learning theory constitutes the basis of the Grammar Translation method which gives importance to the learner's memory ability as it requires the memorization of grammatical rules and vocabulary for the study of the written form of language and the translation of languages (Fasold & Connor-Linton, 2006). Another learning theory is associationism which is a school of psychology related to the ideas of Aristotle who affirmed that learning and memory rely on three criteria: contiguity, similarity and contrast. Contiguity

implies that when elements are learnt together, the act of remembering one item leads to the thought of the other. Similarity means that words are remembered due to the thought of similar concepts. Contrast is linked to the idea that the thought of an item creates the thought of its opposite (Taylor, 2013). In fact, associationism is considered as a foundation of behaviourism which considers language learning as a sort of habit formation relying on imitation, practice and reinforcement. "Instead of speaking of memory the behaviorist speaks of the retention of a given habit in terms of how much skill has been retained and how much has been lost in the period of no practice" (Watson, 1998, p.179). In this way, the behaviourists do not tackle the issue of human memory. However, their research methods were employed by memory researchers. Behaviourism influenced the audio-lingual method which relies on rote memorization, habit formation and feedback (Fasold & Connor-Linton, 2006).

In the 1950's, the cognitivist perspective emerged as a response to the behaviourist view; it is based on the ideas of the Gestalt psychology which focused on the impact of the context on learning and the ways of improving memory. It claimed that meaningful contexts can stimulate memory to facilitate encoding and retrieval of information (Scott, 2007). It tried to relate learning to the brain and to compare language acquisition to the ability of the computer to store and retrieve information. The gestalt view was prominent in the 1930's. By the 1950's, contemporary cognitivism took place as a result of the combination of associationist and Gestalt views into a new view of cognition referred to as information processing theory which views learning as a construction of knowledge that is stored in memory and manipulated by thinking (Mayer, 2003).

Foreign language learning was widely influenced by cognitivism. The research findings of cognitive and educational psychology have revealed the necessity of taking into consideration the learners' emotional and social state which led to the emergence of humanism by the 1960's. In fact, the humanistic perspective gives importance to language use and its relationship with the learner's intellect, emotions and social environment (Tudor, 2001). There are four teaching methods that belong to the humanistic perspective; they are community language teaching, total physical response, the silent way and suggestopedia (Byram, 2000). Community language learning favours the use of the native language in the classroom. Total Physical Response (TPR) was introduced by James Asher in 1977; it was influenced by the ideas of the trace theory of memory which claims that repetition facilitates memory association and recall. The silent way turns around the idea that teaching has to be subordinate to learning in order to enable the learners to be independent (Norland & Pruett-Said, 2006). Suggestopedia is a humanistic method proposed in the 1960's by Georgi Lazanov. It was produced on the basis of the application of yogic techniques and the conclusion that a yogi could memorize a large number of words (Byram, 2000).

The 1970's witnessed the dominance of the innatist perspective which influenced the natural approach and communicative language teaching. This perspective differentiates between language acquisition and learning; the former relies on a mental language organ or language learning abilities while the latter is based on formal instruction. Thus, learning is perceived as declarative knowledge whereas acquisition is considered as procedural knowledge (Lee, 2011).

The sociocultural perspective became dominant by the end of 1980's; it stems from Lev Vygotsky's sociocultural theory referring to the idea that learning involves the learner's zone of proximal development (ZPD) which influenced the work of Albert Bandura who claims that learning occurs by observation which leads to the encoding and storage of information in memory. In 1971, Bandura formulated social learning theory. In 1986, he developed it and called it social cognitive theory. He suggests that observational learning is controlled by four subprocesses including attention, retention, reproduction and motivation (Edwards, 2011). In this theory, learning in general and language learning in particular must involve attention or the learner's concentration and memory as well as motivation. By the 1990's, the cognitivist/developmental perspective focused on language development in relation to cognition. Hence, information processing theory has dealt with the representation of knowledge in memory and the effect of practice on the learners' performance.

Generally speaking, the role of human memory is highlighted in some foreign language teaching methods while it is neglected in others. However, research has proved that memory has a strong influence on foreign language learning as it interferes in the mastery of the four language skills as well as the acquisition of the vocabulary and grammatical structures of the target language. As far as the listening skill is concerned, the sounds that are heard are stored in sensory memory for seconds. Then, they are held in working memory in order to be integrated with other auditory data to achieve language comprehension by forming long messages. Concerning the speaking skill, the learners rely on memory systems for remembering vocabulary that can be used orally (Sousa, 2005). It has been also revealed that memory is related to oral fluency (Gass et al., 2013).

The reading skill involves the process of encoding visual information by sensory memory; then their transfer to working memory allows the reader to process data and finally important information are stored in long term memory (Scott, 2007). Hence, working memory holds information while reading; this enables the reader to process and understand information (Coon & Mitterer: 2009). The act of reading short sentences differs from long sentences in memory time span. When a person reads a word, it is decoded by splitting it into phonemes that are sent to working memory and are combined to form words that are understood by the readers. Thus, reading isolated words does not take much time. Reading simple sentences requires minimal memory time span

whereas reading complex sentences involves a longer memory time span (Sousa, 2005).

Working memory is involved in the writing skill as it supplies the writers with a temporary store for the ideas in their written production. Also, it temporarily stores orthographic, morphological, lexical, syntactic and semantic data while writing (Olive, 2012). Research has proved that writing involves three cognitive processes: planning, translating and reviewing. In fact, translating which implies writing down ideas either on paper or by typing on a word processor depends on working memory (Mayer, 2003).

The process of learning a new language is tightly linked to the act of remembering data which is the task of memory since it is responsible for the retention of learnt information. Moreover, there is a strong relationship between the capacity of phonological short term memory and the learners' success in learning the vocabulary and grammar of a foreign language (Gass et al., 2013). Generally speaking, memory influences the process of learning foreign languages.

## 4. Memory and Learners' Performance: A Case Study

Foreign language learning and instruction can not be separated from the process of assessment which can take place for many purposes including selection, diagnosis and evaluation. The type of assessment that is employed for diagnosis allows the teacher to get informed about the learners' degree of achievement in learning (Bachman, 1990); it also helps to measure students' knowledge and their level of improvement. Hence, diagnostic assessment enables the teacher to gather information about the learners' strengths and weaknesses as well as the main factors that affect their learning. In addition to this, it may be used to check the learners' ability to retain and retrieve information which refers to memory tasks. In this respect, a case study was undertaken in order to investigate the relationship between memory, foreign language learning and learners' achievement. The studied case involved first year students studying English as a foreign language (EFL) at Tlemcen University. It aimed at answering the following research questions:

1-  How does memory affect foreign language learning and achievement?

2-  What are the main variables that affect memory capacity?

3-  What are the difficulties faced by foreign language learners when retrieving content knowledge?

The above questions led to the formulation of the following hypotheses:

1- Memory may have a great impact on foreign language learning as it is responsible for learners' retention of the taught information and the accumulation of linguistic knowledge that may facilitate the mastery of language. Also, it may determine the learners' level of achievement as it represents a vital factor that is involved in the process of information retrieval and language production.

505

2- Memory capacity and the ability to remember information may vary from a learner to the other because of a set of variables like gender and performance level.

3- Some learners may not be able to remember the taught information and retrieve knowledge which leads them to perform poorly. On the other hand, other learners may remember information but they may fail to articulate the taught knowledge in an appropriate way.

In order to gather data, a written test was used as a research instrument. According to Genesee & Upsher (1996), assessment tasks depend on the objectives of testing. Thus, the given test had to combine between assessment tasks and memory tasks. Assessment tasks include open-ended, close-ended and limited response format. On the other hand, memory tasks involve explicit and implicit memory tasks. Explicit memory tasks denote declarative knowledge which includes recall and recognition; they may rely on activities involving gap-filling and multiple-choice items. Implicit memory tasks reflect procedural knowledge; they often take the form of word completion tasks (Sternberg & Sternberg, 2006).

In addition to this, the design of the test was based on testing the writing skill using the taxonomy of teaching objectives designed by Benjamin Bloom in 1956. This taxonomy encompasses various levels including knowledge, comprehension, application, analysis, synthesis and evaluation. The given test involved the first three levels. In fact, knowledge and comprehension are related to declarative knowledge (Dunn et al., 2004); application demonstrates procedural knowledge (O'Malley & Chamot, 1990). These levels refer to the learners' cognitive skills concerning recall or recognition, understanding and use of information. The main purposes of the different tasks used in the test are summarized in the following table.

506

**Table 1**: *The objectives of the assessment tasks*

| Activity | Type of memory tasks | Tested knowledge | Learning objective |
|---|---|---|---|
| Task 1: Gap-filling | Explicit memory task | Recall of information | Knowledge |
| Task 2: Word completion | Implicit memory task | Procedural knowledge | Application |
| Task 3: Multiple choice items | Explicit memory task | Recognition of concepts and facts | Knowledge |
| Task 4: 'Wh' questions | Explicit memory task | Declarative knowledge | Knowledge and comprehension |

The test included four (4) tasks that constitute a set of subtests aiming at assessing the learners' knowledge and degree of retention of the taught material. The first task involved a gap filling activity; it is illustrated in the figure below.

I) *Fill in the gaps:*
1- ............... refers to the study of the psychological factors that affect language use.
2- Grammar is .............. as it provides rules.
3- Language refers to the communication of thoughts and feelings through a system of ..........
signals.
4- Communication means the exchange of information by......, signals, .......... or behaviour.
5- A ........... is a group of words expressing thought.

*Figure1*. Gap-filling activity

Thus, the first exercise falls within the limited response format as it requires a specific answer that should be supplied by the learner; it is also considered as a recall task; it aimed at testing the learners' knowledge of the taught concepts and their definitions. On the other hand, the second activity represented a word-completion task as it is shown in the following figure.

II) *Complete the words:*

a_c_n_          d_a_e_t          i_i_le_t    m_a_in_    f_r_
s_m_nt_c_       p_i_o_og_        _p_ec_      s_n_k_i_    _r_m_a_ia_

*Figure 2*. Word-Completion Task

Hence, the second exercise was in the form of a limited response format; it assessed procedural knowledge through learners' application of learnt information. The third activity relied on the close-ended response format as it included multiple choice items. It is elicited in the figure below.

III) *Circle the correct answer:*
1- Traditional language studies focus on:   writing – speech – literary texts – syntax
2- Language refers to:
   a social activity - a cognitive process – an instinctive method – an innate capacity
3- The purpose of linguistics is to study:
   language varieties  - social groups – the history of languages
4- Language relies on the use of:
   Symbols - unintentional signals - intentional signals
5- Modern linguistics appeared in:
   The 12th century - the 18th century - the 20th century - the 19th century

*Figure 3*. Multiple choice items

In fact, the third exercise is a recognition task; it measured the learners' knowledge of the taught material. The last activity involved 'Wh' questions representing the limited response format as each question required a short answer in the form of a sentence produced by the learner. It is illustrated in the following figure.

507

*IV) Answer the questions:*
1- What is Sanskrit?
2- Who is Panini?
3- What is cognition?
4-What is philology?
5-Why is language specific to the human being?

*Figure 4.* 'Wh' questions

Therefore, the fourth task tested declarative knowledge; it aimed at checking the learners' ability to remember and understand the taught information.

The test was administered to a sample including thirty (30) learners. It was scored using a 20-point rating scale. Each activity was assigned five (5) points out of twenty. In order to check the learners' differences in performing each task on its own, the researcher used a six point rating scale ranging from zero (0) to five (5); the zero denoted the non-existence of performance while five referred to complete performance of the task. The analysis of data relied on the use of descriptive statistics.

Concerning the learners' general performance, thirteen (13) students, representing 43.33% out of the total population, obtained marks below the average while seventeen (17) learners, representing 56.66% performed well. The mean of the group was 10,27 while the standard deviation ($S_x$) was 4,52. The coefficient of variation (Cv) was 0,44. Hence, it can be stated that the learners' level average and the degree of variability is not very high. The descriptive statistics of the scores concerning each task are illustrated in the table below.

508

**Table 2**: *The Test Results*

|       | Test  | Task1 | Task2 | Task3 | Task4 |
|-------|-------|-------|-------|-------|-------|
| Mean  | 10,27 | 2,93  | 3,28  | 1,65  | 2,40  |
| $S_x$ | 4,52  | 1,00  | 1,54  | 0,83  | 1,89  |
| Cv    | 0,44  | 0,34  | 0,47  | 0,50  | 0,79  |

The learners seem to have a difficulty in completing the recognition task (M=1,65). The degree of variability is larger in the fourth task ($S_x$=1,89) and the second activity ($S_x$=1,54). Moreover, the coefficient of variation is small in the first task (Cv=0,34); it is nearly medium in the second task (Cv=0,47); it is medium in the third task (Cv=0,50) while it is high in the last one (Cv=0,79). Thus, the degree of variability increases in the task that assesses knowledge and understanding. This is shown in the following bar-graph.
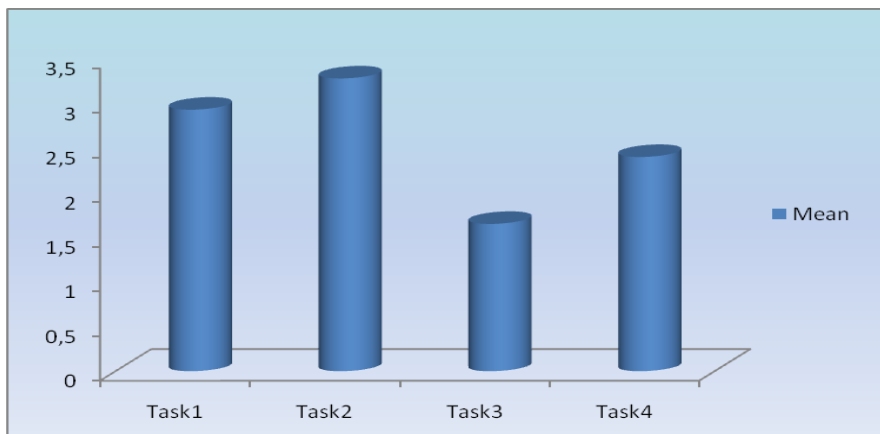
*Bar graph 1*. Degree of Variability in the assessment tasks

Therefore, some learners may have difficulties at the level of knowledge and comprehension as well as the application of the learnt information.

In order to investigate the relationship between memory and the level of performance, the learners' results were classified into two subgroups. The first subgroup included low performing students while the second subgroup concerned the high performing learners. The first subgroup involved thirteen students whose mean of scores was 5,65 reflecting a low level of performance with a moderate degree of variability (Cv=0,46). The results of the low performing learners are illustrated in the table below:
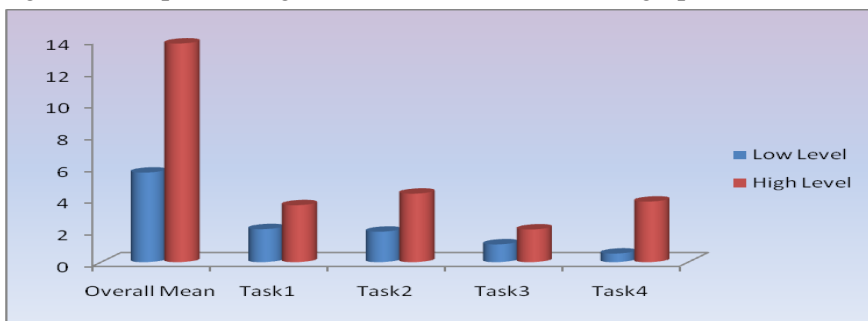
**Table 3**: *The results of low performing students*

|       | Test | Task1 | Task2 | Task3 | Task4 |
|-------|------|-------|-------|-------|-------|
| mean  | 5,65 | 2,08  | 1,92  | 1,12  | 0,54  |
| $S_x$ | 2,59 | 0,86  | 1,44  | 0,79  | 0,88  |
| Cv    | 0,46 | 0,42  | 0,75  | 0,71  | 1,63  |

Therefore, weak learners did not perform well in all the tasks especially the ones that were related to content knowledge and comprehension (M=0,54). When analysing the results of the group of low performing learners, one can infer that some students have difficulties in remembering (recall and recognition) while the majority of these learners have difficulties in writing sentences. On the other hand, the second subgroup included seventeen students; their mean of scores was 13,79 revealing a high level of performance with a low degree of variability (Cv=0,12). The results of the high performing learners are summarized in the following table.

**Table 4**: *The results of high performing students*

|      | Test  | Task1 | Task2 | Task3 | Task4 |
|------|-------|-------|-------|-------|-------|
| mean | 13,79 | 3,59  | 4,32  | 2,06  | 3,82  |
| $S_x$ | 1,69  | 0,51  | 0,50  | 0,63  | 1,07  |
| Cv   | 0,12  | 0,14  | 0,12  | 0,31  | 0,28  |

Thus, high performing students performed well in the majority of the activities with the exception of the recognition task (M=2,06). The variation in the results of high and low performing learners is elicited in the bar graph below.



*Bar graph 2*. Variation in the results of high and low performing students

Hence, it can be noticed that low performing learners could not answer the 'Wh' questions (Cv=1,63) although some of them were able to do the gap-filling and word completion tasks. This implies that some learners can not produce sentences even if they can remember information or have a sort of knowledge about the topic. However, high performing learners exhibited a high level of mastery of declarative and procedural knowledge.

In addition to the variation in learners' performance, the relationship between memory and gender was studied. Thus, the students' results were classified into two subgroups including male and female learners. The first subgroup involved eleven (11) male students; displaying low performance as the mean of their scores was 6,77 ; the degree of variability was somewhat high (Cv=0,62). The results of this subgroup are provided in the following table:

**Table 5**: *The results of male learners*

|      | Test | Task1 | Task2 | Task3 | Task4 |
|------|------|-------|-------|-------|-------|
| mean | 6,77 | 2,18  | 2,32  | 1,09  | 1,18  |
| $S_x$ | 4,19 | 1,08  | 1,59  | 0,66  | 1,83  |
| Cv   | 0,62 | 0,49  | 0,68  | 0,61  | 1,55  |

From the above table, it can be inferred that male learners did not perform well in all the tasks especially the recognition and recall of information. On the other hand, the second subgroup included nineteen (19) female students whose mean

of scores was 12,29; the degree of variability of scores was low (Cv=0,29). The results of this subgroup are summarized in the table below:

**Table 6**: *The results of female learners*

|        | Test  | Task1 | Task2 | Task3 | Task4 |
|--------|-------|-------|-------|-------|-------|
| mean   | 12,29 | 3,37  | 3,84  | 1,97  | 3,11  |
| $S_x$  | 3,55  | 0,68  | 1,29  | 0,77  | 1,63  |
| Cv     | 0,29  | 0,20  | 0,34  | 0,39  | 0,52  |

Therefore, female learners accomplished the majority of the tasks; they did not perform well in the recognition task. The following bar graph displays the variation in the results of male and female students.
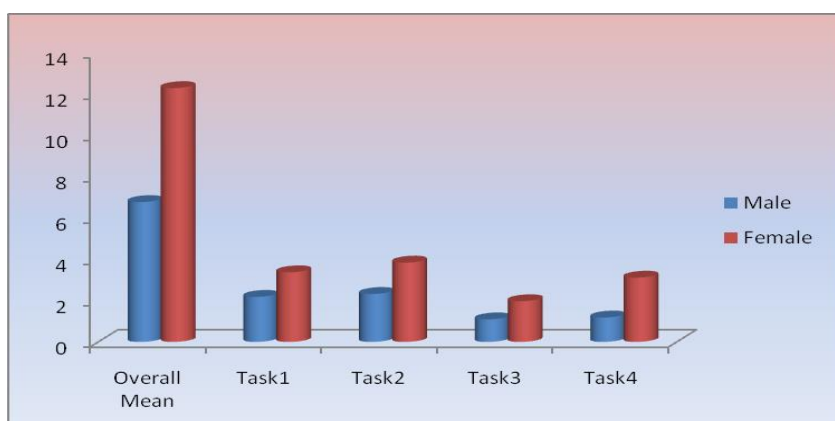


*Bar graph 3*. Variation in the results of male and female learners

Hence, female learners performed better than male learners. Even at the level of the recognition task which was not totally completed by the girls, one can notice a variation in gender performance as the degree of difficulty of this task is nearly medium within female performance (M=1,97 ; Cv=0,39) while it is high concerning male performance (M=1,09; Cv=0,61).

It can be stated that the given test attempted to asses the learners' mastery of content knowledge which may take the form of declarative or procedural knowledge. However, it focused more on explicit memory tasks. In fact, such type of tests does not provide a complete view about the learners' mastery of language. As an example, the last exercise which involved 'Wh' questions tested declarative knowledge through the learners' production of sentences which also concerns their mastery of the writing skill. The analysis of the utterances produced by the students revealed that some students gave correct answers but the sentences they wrote were ill-constructed. For instance, seven learners (23,33%) made grammar mistakes; eight students (26,66%) produced sentences including spelling and grammar mistakes; six students (20%) made spelling mistakes. Hence, the learners may have information about the taught material but they fail to retrieve them in an acceptable way because they lack

the knowledge of grammar and writing conventions representing procedural knowledge that is involved in the mastery of skills.

## 5. Discussion and Suggestions

The research results revealed that some EFL learners have difficulties at the level of recall, recognition and application of the taught information. This implies that memory has a certain effect on foreign language learning and achievement. As a result, the first hypothesis is confirmed. In this respect, Gass et al. (2013) claim that memory plays an important role in language performance which reflects success or failure in learning a foreign language. Thus, the students who have difficulties in learning find some problems in answering the questions of tests or examinations. Moreover, some researchers view that working memory represents language aptitude (Miyake & Friedman, 1998); others consider it as a central component of aptitude (Chan et al., 2012).

The second hypothesis is validated as the research results have divulged that memory is interrelated with a set of variables such as learners' gender and level of performance. In fact, the test results elicited that good learners are able to recall and retrieve content knowledge while weak learners have problems in remembering information. In this sense, one can mention the study undertaken in 1997 by Anderson and Cohen in order to investigate the relationship between memory and learners performance through the analysis of the R-to-K shift which implies the change from R (Remember) responses to K (Know) answers; this study has shown that the number of R responses produced by high performing learners in an achievement test was larger than the K answers while the number of K answers formulated by the same learners in the final examination was larger than R responses. This has led to the conclusion that high performing students have the capacity to encode, store and retrieve content knowledge successfully (O'connor et al. 2008).

512

In addition to the identification of the relationship between memory and performance level, the present study highlighted the issue of gender and memory since the results revealed that female learners performed better than male learners in all the tasks. In this sense, Maynard claims that "girls have better memories and can retrieve information more quickly from the memory" (2010, p. 28). Also, Brantmeier et al. (2010) assert that female learners perform better than male learners in foreign language tests.

Concerning the third hypothesis, one can say that it is confirmed. From the test results, it can be inferred that some learners had difficulties in remembering information as they did not perform well in the recall and recognition tasks. In this sense, Jensen (1998, p. 104) refers to forgetfulness as "a temporary performance deficit" claiming that successful retrieval of information relies on the degree of attention during the encoding process and the person's state as well as the time and context of retrieval. Moreover, the test results revealed that some learners could provide some responses for the recall, recognition and word completion task but they were unable to answer the 'Wh' questions; this implies

that they have difficulties at the level of sentence production. According to Mayer, "the process of translating places a heavy cognitive load on the writers' working memories" (2003, p. 54). Also, Westwood (2004) affirms that difficulties in writing may be caused by limitations in working memory.

Research has proved that foreign language learning is influenced by several factors including the learners' age, gender, intelligence, aptitude and motivation. Biedron (2011) affirms that memory plays an important role in foreign language aptitude. However, memory may be affected by a set of factors such as the lack of motivation, lack of concentration, lack of repetition, the irrelevance of the taught information, the learners' emotional state like stress and anxiety as well as proactive interference which implies that prior knowledge hinders the storage of the new one and retroactive inhibition which means that new information prevent the recall of stored information. These factors may lead the learners to forget information and may cause some learning difficulties (Westwood, 2004).

The suggestions that can be provided to develop the learners' cognitive capacities and their ability to learn the language should focus on decreasing the factors that influence memory in a negative way. According to Oxford (2011) learning relies on the storage of data into long term memory which is achieved via the use of the learnt information. This means that practice is very essential for language learning. Westwood (2004) suggests that memory can be improved through repetition and practice, the revision of the taught information, the instruction of rehearsal strategies, the engagement of learners' attention via the use of practical teaching techniques and interesting teaching materials as well as the employment of mnemonics and the introduction of over learning which refers to excessive practice. Scott (2007) mentions memory training which can be achieved through repetition, practice and a variety of activities. Note taking is a very useful technique that can be employed to help the learners to remember information. It is considered as a memory aid that enhances the storage of the taught knowledge (Herrmann et al., 2002). Continuous assessment may also be a useful tool for developing the learners' memory as it enables them to practise using the taught material by providing information about their level of performance which reflects the strength of their retrieval of information. According to Roediger & Butler (2011), the process of testing causes an alteration in memory and leads to the retention of information for a long period.

Therefore, the teachers should motivate the learners and increase their concentration by using interesting materials such as stories and games. Also, the provision of comprehensible input is important because it facilitates understanding which is a means of remembering information and achieving efficient learning. Moreover, establishing a friendly atmosphere is necessary since it helps to decrease the learners' anxiety in order to make them collaborate and use the target language.

## Conclusion

Foreign language learning and achievement may depend on memory capacity. Hence, the improvement of memory can help the learners to learn foreign languages and perform well. This task can be achieved by increasing the learners' awareness of the role of cognitive abilities. Moreover, the teachers' knowledge of memory models may help them to adopt teaching strategies that take into consideration the role of attention, repetition, motivation and depth of knowledge in learning and instruction. As a conclusion, one can say that memory is not the only factor involved in foreign language learning and performance which may be influenced by learners' cognitive and psychological processes, the teaching methods, the instructional input, the degree of the difficulty of tasks as well as the social environment. Further research may unveil the factors leading to success or failure in learning a foreign language.

## REFERENCES

Bachman, L. (1990). *Fundamental Considerations in Language Testing*. Oxford: Oxford University Press.

Baddeley, A. (2004). The Psychology of Memory. A. Baddeley, M. D. Kopelman, & B. Wilson (Eds.). *The Essential Handbook of Memory Disorders for Clinicians* (pp. 1-13). England: John Wiley and Sons Ltd.

Biedron, A. (2011). Near Nativeness as a Function of Cognitive and Personality Factors: Three Case Studies of Highly Able Foreign Language Learners. M. Pawlack, E. Waniek-Klimczak, & J. Majer (Eds.). *Speaking and Instructed Foreign Language Acquisition* (pp.99-116). UK: Multilingual Matters.

Brantmeier, C., Schueller, J., Wilde, J., & Kinginger, C. (2010). Gender Equity in Foreign and Second Language Learning. S. Klein, B. Richardson, D. Grayson, L. Fox, C. Kramarae, D. Pollard, & C. Puyer (Eds.). *Handbook for Achieving Equity through Education* (pp. 305-334). New York: Routledge.

Byram, M. (2000). *Routledge Encyclopaedia of Language Teaching and Learning*. London: Routledge.

Chan, W., Chin, K., Bhatt, S., & Walker, I. (2012). *Perspectives on Individual Characteristics and Foreign Language Education*. Germany: Walter De Gruyter.

Chauhan, S. (1978). *Advanced Educational Psychology*. New Delhi: Vikas Publishing House.

Clarke, V. (2003). *Effective Strategies in the Teaching of Mathematics: A Light from Mathematics to Technology*. USA: University Press of America.

Coon, D., & Mitterer, J. (2009). *Psychology: A Journey*. UK: Cengage Learning.

Dunn, L., Morgan, C., O'Reilly, M., & Parry S. (2004). *The Student Assessment Handbook: New Directions in Traditional and Online Assessment.* London: Routledge.

Edwards, W. (2011). *Motor Learning and Control: From Theory to Practice*. USA: Wadsworth.

Fasold, R., & Connor-Linton, J. (2006). *An Introduction to Language and Linguistics*. Cambridge: CUP.

Gass, S., Behney, J., & Plonsky, L. (2013). *Second Language Acquisition: An Introductory Course* (4th ed.). New York: Routledge.

Genesee, F., & Upshur, J. (1996). *Classroom Based Evaluation in Second Language Education*. Cambridge: CUP.

Herrmann, D., Raybeck, D., & Gruneberg, M. (2002). *Improving Memory and Study Skills: Advances in Theory and Practice*. USA. Hogrefe and Huber Publishers.

Jensen, E. (1998). *Teaching With the Brain in Mind*. USA: ASCD.

Lee, N. (2011). The Neurobiology of Procedural Memory. J. Schumann, S. Crowell, & N. Jones (Eds.). *Neurobiology of Learning: Perspectives from Second Language Acquisition* (pp. 43-74). New York: Routledge.

Mayer, R. (2003). Memory and Information Processes. W. Reynolds, & G. Miller (Eds.). *Handbook of Psychology* (pp 47-58). New Jersey: John Wiley and Sons.

Maynard, S. (2010). *Learning through Adventurous Activities: 75 Lesson Ideas to Engage Boys and Girls*. London: Optimus Education Ebooks.

Miyake, A., & Friedman, N. (1998). Individual Differences in Second Language Proficiency: Working Memory as Language Aptitude. A. Healy & L. Bourne (Eds.). *Foreign Language Learning: Psycholinguistic Studies on Training and Retention* (pp. 339-364). USA: Psychology Press.

Moxon, D. (2000). *Memory*. Oxford: Heinemann Educational Publishers.

Norland, D., & Pruett-Said, T. (2006). *A Kaleidoscope of Models and Strategies for Teaching English to Speakers of Other Languages*. USA: Libraries Unlimited.

O'connor, A., Moulin, C., & Cohen, G. (2008). Memory and Consciousness. G. Cohen and M. Conway (Eds.). *Memory in the Real World* (pp. 327-356). USA: Psychology Press.

O'Malley, M., & Chamot, A. U. (1990). *Learning Strategies in Second Language Acquisition*. Cambridge: CUP.

Olive, T. (2012). Writing and Working Memory: A Summary of Theories and Findings. E. Grigorenko, E. Mambrino, & D. Preiss (Eds.). *Writing: A Mosaic of New Perspectives* (pp. 125-140). New York: Psychology Press.

Oxford, R. (2011). *Teaching and Researching: Language Learning Strategies*. USA: Pearson Education Limited.

Roediger, H., & Butler, A. (2011). Paradoxes of Learning and Memory. N. Kapur (Ed.). *The Paradoxical Brain* (pp. 151-176). Cambridge: CUP.

515

Scott, G. G. (2007). *30 Days to a More Powerful Memory.* USA: Amacom.

Sousa, D. (2005). *How the Brain Learns to Read*. USA: Corwin Press.

Sternberg, R., & Sternberg, K. (2006). *Cognitive Psychology*. USA: Wadsworth.

Taylor, A. K. (2013). *Encyclopaedia of Human Memory*. USA: Greenwood Publishing.

Tudor, I. (2001). *The Dynamics of the Language Classroom*. Cambridge: CUP.

Watson, J. (1998). *Behaviorism*. New Jersey: Transaction Publishers.

Westwood, P. (2004). *Learning and Learning Difficulties*. Australia: Acer Press.