Learning Preferences INTERACTION with Working Memory in University-Level Language Acquisition

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Abstract

The aim of this research is to gain a better understanding of L2 speech performance from the perspective of learning preferences in the working memory capacity and oral performance of EFL learners. The research sheds light on the role of perceptual and central attention in the encoding, maintenance, and manipulation of information in learners' working memory while defining their styles of learning, which determine their learning strategy. the study used the quantitative qualitative method to each the answers for questions. The participants are 60 students at the General Department, Faculty of Education, Damanhour University. Results show a positive relationship between working memory and approaches to learning with students at a higher level of production. Students at a lower level of production seem to use complex approaches to learning. Working memory is assessed by a speaking span test that taxes the processing and storage functions of working memory during sentence production. Results suggest that the functional capacity of working memory varies with the processing characteristics of the task being performed. A learning style questionnaire was used to recognize learners' learning styles. The research concludes with a discussion of how learning styles and working memory interact to create learners who speak fluently.

Key words: working memory, learning style, speaking fluency. Language acquisition,

ملخص الدراسة

هدف البحث الحالي إلى التعرف على أفضل كيفية لفهم الأداء الشفهي للطلاب في اللغة الثانية من منظور ربط انماط التعلم المفضلة لديهم وسعة الذاكرة العاملة والأداء الشفهي لمتعلمي اللغة الإنجليزية كلغة أجنبية. ويسلط البحث الضوء على دور الانتباه الإدراكي والمركزي في ترميز المعلومات ومعالجتها في الذاكرة العاملة للمتعلمين أثناء تحديد أنماط التعلم الخاصة بهم، والتي تحدد أيضا استراتيجية التعلم التي يستخدمونها. شارك في هذا البحث عدد (60) طالباً وطالبة من الشعبة العامة تخصص اللغة الإنجليزية بكلية التربية جامعة دمنهور. وقد أسفرت النتائج عن وجود علاقة ارتباط إيجابية بين الذاكرة العاملة وأنماط التعلم المفضلة لدي عينة الطلاب المحققين لأعلى مستوى من الأداء الشفهي. كما أسفرت النتائج عن أن الطلاب المحققين لأدنى مستوى من الأداء الشفهي يفضلون استخدام أنماط التعلم المعقدة. وتم قياس مستوى أداء الذاكرة العاملة من خلال اختبار يقيس وظائف المعالجة والتخزين أثناء أداء الجمل شفهيا. كما تشير النتائج إلى أن الحالة الوظيفية للذاكرة العاملة تختلف باختلاف خصائص المعالجة للمهام التي يتم تنفيذها في العقل. وتم استخدام استبانة لتحديد نمط التعلم لدى المتعلمين. وقد أختتم البحث بمناقشته حول تفاعل أنماط التعلم والذاكرة العاملة ذو تأثير دال على مهارة التحدث بطلاقة أكثر.

الكلمات المفتاحية: الذاكرة العاملة، أنماط التعلم، الأداء الشفهي، اكتساب اللغة، طلاب الجامعة.

Introduction:

Learning is the transference of knowledge from one person or one source to another, whether by searching or receiving according to the learner's preference. As a medium for achieving two important targets, language is a tool for learning and communication in all branches of science. From the perspective of linguistics, language is "a system of arbitrary, vocal symbols which permit all people in each culture, or other people who have learned the system of that culture, to communicate or to interact"

(Finocchiaro, 1964: 8). The main goal of any language policy should be changing those results in the spontaneous language use of a large community of speakers. This is the only indicator that can measure the efficacy of a language. The surrounding people or the environment are responsible for forming the input language learned through the cultural and social context and thus forming learning habits regarding a specific language. Mothers provide a strong source of language input for children in the first critical stage of learning. In schools, children receive the same activities, the same amount of practice, and the same learning strategies, but at home or in society (social context), they perform different ways of processing knowledge regarding language learning. The school context is a variable that forms learning habits and styles. Saville (2006, p.9) states, "Much of your own L1 acquisition was completed before you ever came to school, and this development normally takes place without any conscious effort [;] by the age of six months an infant has produced all of the vowel sounds and most of the consonant sounds of any language in the world". However, SLA is highly complex in nature, partly because scholars who teach SLA come from academic disciplines that differ greatly in their theory and research methods. Therefore, the view emerged that children learn language by imitation (the stimulus response theory). This theory suggests that children's initial language learning can be attributed to their imitation of the sounds and words around them. Language inputs and methods of learning are therefore different. Consequently, the language output and skill produced are also different. The following quotation may explain why some learners are more successful than others:

The focus on learner differences in SLA has been most concerned with the question of *why* some learners are more successful than others. It arises in part from the humanistic framework within psychology, which has a long history in that discipline, but has significantly influenced second language teaching and SLA research only since the 1970s. This framework calls for consideration of emotional involvement in learning, such as affective factors of attitude, motivation, and anxiety level. This focus also considers biological differences associated with age and sex, as well as some differences associated with aspects of processing. (TROIKE, 2006.p37)

Speaking

Many Egyptian learners actively attempt to find opportunities to use the English language but feel frustrated because of their lack of proficiency. Learning to speak a foreign language requires more than knowing its grammatical and semantic rules. Speaking a language is especially difficult for foreign language learners because effective oral communication requires the ability to use the language appropriately in social contexts. Speaking is important at this stage as students may be graded on their oral participation in conversational courses. In China, the adults lose face if they cannot speak well. One way of helping adults to cope with this situation is to create opportunities for learners to speak and be heard (Richards & Renadya, 2002).

Speaking skill depends on one's compatibility with the mental abilities of analysing, synthesizing, and evaluating knowledge of language. It is affected by practice and attitudes to produce correct sounds in speech, including words or sentences of paragraphs. Speaking is a comprehensive skill in which learners must select and utilize what they have already learned. Florez (1999. pp. 1–2) notes:

> Speaking requires that learners not only know how to produce specific points of language such as grammar, pronunciation, or vocabulary . . . but also that they understand when, why, and in what ways to produce language.

This means that learners respond to producing a spoken language because of correct understanding of a message they hear, even if they have other components of language skills. Nakamura & Valens (2001) list nine traits to be tested in speaking: pronunciation, grammar, discourse, fluency, content, vocabulary, comprehensibility, interactional competence, and sociolinguistic competence. Hence, spoken language proficiency involves the ability to fluently and accurately produce autonomous utterances that are appropriate to the context of the speech situation. In other words, a good speaker synthesizes speaking skills and knowledge to succeed in speech acts. Consequently, the most common repetitive sub-skills of speaking focus on 1) fluency; 2) vocabulary; and 3) accuracy (use of grammar rules). Longman's Dictionary of Language Teaching and Applied Linguistics defines second language fluency as:

the ability to produce written or/and spoken language with ease…speak with a good but not necessarily perfect command of intonation vocabulary and grammar communicate ideas effectively and produce continuous speech without causing comprehension difficulties or a breakdown of communication…. (p.141

The degree of fluency varies with the nature of the learner's community, background, and goals. Non-natives are not expected to perfect the language to the same degree as natives. It is simply a question of achieving flow in interaction (McCarthy, 2008). In the present research, Mizera's (2006) definition of fluency, the ability to spontaneously speak a language quickly and comprehensibly, is adopted. Non-fluent L2 speech may be accurate but slow or effortfully produced, with hesitations and restarts (De Bot, 1992; Kormos, 2006). Scholars such as Brynildssen (2000), Groot (2000), Hulstijn (2000), Al-Seghayer (2001), Nikolova (2002), and Nation (2001) refer to the importance of vocabulary in improving speaking skill. Learners spontaneously recall words that are not only known by sight but also understood well enough to be used correctly. Vocabulary expansion spontaneously occurs through the practice of other language skills. Vocabulary as a sub-skill is very important; therefore, it is repeated in the four main skills as an essential sub-skill, particularly in reading and writing, despite its different nature in each skill. Grammar also plays a key role in the English language. Researchers such as Celce-Murcia and Olshtain (2000)

consider it the basic way of mastering language skills. Wyse and Jones (2001) define grammar as a fixed and unchanging series of rules that should be applied to give a "structure" to the language (Gabrielatos, 2002). For Stott and Chapman, (2001. pp.105-122),

> Knowing grammar is to know at least a thousand different aspects of grammatical construction and manipulating the conventions of grammar use across several different genres of communication.

The communicative approach addresses language in relation to the way it may be structured in the speaker's mind and the principles and parameters that are available to the speaker when producing the language. An important aim of the communicative approach is to improve learners' ability to use and understand the spoken language (Leech & Svartvik, 2003). This cannot be done unless learners have opportunities to practise and apply what they already know about language. Thus, learners need to have structured/ formal and spontaneous opportunities to speak.

Learning Styles

According to Sarasin (1999, p.7), "teaching cannot be successful without a knowledge of learning styles and a commitment to matching them with teaching styles and strategies The term "learning style" has been used to describe an individual's natural, habitual, and preferred way of absorbing, processing, and retaining information and skills (Reid 1995). For Shih & Gamon, (2002), learning style is very important for teaching and learning (for the teacher and students). As Sarasin (1999) notes, part of the

role of learning style (in addition to its other roles in learning) is to provide a link between cognition and personality. A review of the literature reveals that the general definition identifies learning style as the way a learner takes in and processes information or individuals preferred and consistent set of behaviours or approaches to learning (Cooze & Barbour, 2005). Scholars such as Ally & Fahy (2002) separate individual learning styles into two components: perceiving (the way individuals absorb information around them) and processing (how they understand the information that is absorbed). By understanding more about learners, it may be possible to enhance their learning. Awareness of differences in learners' learning styles is vital for educators to aid the learning process.

> If we can find variables that impact learner success, we might be able to design courses according to the learners' preferred learning styles to help bridge the gap of not knowing the learners as well as in a face-to-face environment (Du & Simpson, 2002, p. 4).

This means that how the way teachers present information to learners according to their preferences plays a key role in the way learners gain the knowledge they seek. In so doing, instructors choose appropriate learning strategies to achieve their targeted objectives. Cultural backgrounds affect students' learning styles and learning strategies and must be considered when designing and delivering instruction (Charlesworth 2008). Jia-Ying (2011) shows that cultural values affect interactions between learners and teachers as understanding of cultural norms and values affects

teachers' interactions with students, which leads to more effective teaching.

In summary, previous studies reveal the influence of learners' learning style preferences in various contexts. Thus, it is advisable to use different types of instructional materials and teaching strategies to reach different types of learners in multicultural classrooms. Nunan (1991) suggests that learning styles are based on the way learners learn or are exposed to language learning. He suggests four types of learners:

1. *Concrete,* which refers to learners who use their senses of sight, smell, touch, taste, and hearing. They view things in a tangible, factual and literal way.

2. *Analytical,* which refers to learners whose cognitive strengths lead them to careful analysis and great interest in structure. Learners in this group prefer to study individually, find their own mistakes and work on assigned task problems.

3. *Authority-oriented,* which refers to learners who would like their teacher to be the source of knowledge. They tend to write everything in their notebook, prefer to study grammar rules and learn by reading.

4. *Communicative,* which refers to learners who have a desire for a communicative and social learning approach. They prefer learning by watching, listening to native speakers, talking to friends, and watching television in English, using English outside class, and learning new words by hearing and conversation.

Bennett (1986) believes that "teachers teach as they have been taught to learn and that culture shapes learning style [;] students who share a teacher's ethnic background will be favoured in class" (p. 96). He also warns that ignoring the effects of culture and learning style affects all students:

> If classroom expectations are limited by our own cultural orientations, we impede successful learners guided by another cultural orientation. If we only teach according to the ways we ourselves learn best, we are also likely to thwart successful learners who may share our cultural background but whose learning styles deviate from our own. (p. 116)

In an individual teaching and learning situation, whether in class or outside, the teacher may adapt to the students by responding to their needs, or students may adapt to the teacher by receiving only what teachers present to them. At the same time, parents adapt to the styles of their children, or the children adapt to the parents' style, as the children have previously learned. In this case, the parents or teachers' styles may differ from the learner's style. In all cases, the teacher and the parents are both creating or modifying (or at least affecting) the learner's personal real learning style and are pushing him to create his strategy of personal learning outside of any scientific approach by depending upon himself or his unhealthy habits in learning.

Learning styles is a term generally used to describe an individual's natural or habitual pattern of acquiring and processing

information in learning situations, and each student formulates learning habits according to what is formed in his mind about learning itself and how the assessment process is performed (the parents' or teacher's responsibility or culture) (Saville, 2006). Learners set targets for themselves and perform tasks to achieve these targets, regardless of whether this involves good or inappropriate habits. If needed to obtain a good grade, the learner may prefer to memorize even if he is not supposed to do so. These habits continue through different learning stages or until the learner learns what he is requested to learn. No learner has one defined style; he must use his senses together to perform the learning process. According to Kolb's model, Figure (1) shows the gradual shift from one style to another. Various styles may be performed in one learning situation according to the discourse or context.
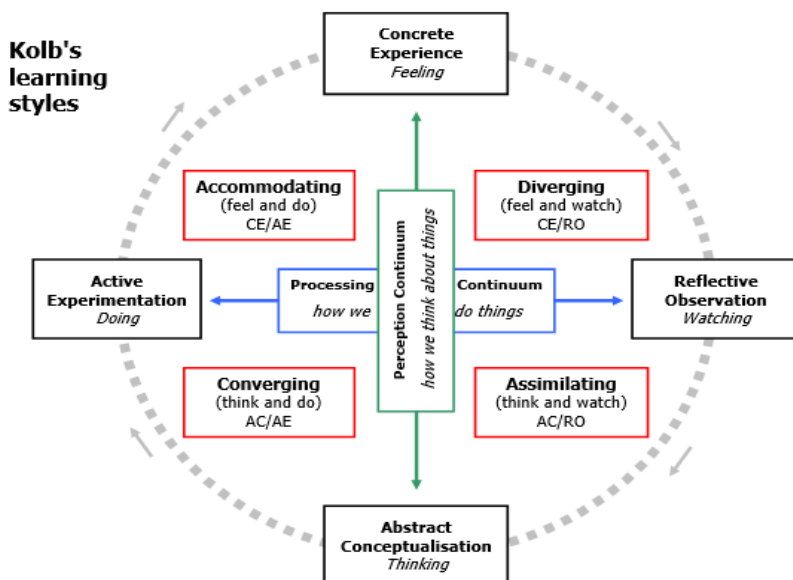

Figure (1) Kolb's Learning Styles

Many studies have shown that multiple factors affect learners' learning styles, such as age, culture, and gender (Charlesworth, 2008; De Vita, 2010, Song & Oh, 2011). The cultural aspect is very clear when the learning process includes different learners of unfamiliar cultural backgrounds. Studies of learning preferences suggest different strategies to fit different learners. Oxford (1993) defines learning strategies as:

> specific actions, behaviors, steps, or techniques that students (often intentionally) use to improve their progress in developing L2 skills. These strategies can *facilitate* the internalization, storage, retrieval, or use of the new language. Strategies are tools for the self-directed involvement necessary for developing communicative ability. (p. 18)

For Oxford, there are six interrelated strategy categories that interact with one another. She classifies these as cognitive strategies that enable learners to interact in the target language; metacognitive strategies that help learners to control and regulate their learning; affective strategies that help learners address their feelings and emotions; and social strategies that promote learning through interaction with speakers of the target language. In addition to memory strategies that help learners store and retrieve information, compensation strategies are employed when learners need to keep communication going despite a gap in their linguistic knowledge. Learners' awareness of these types increases their learning proficiency.

According to Droz´dział-Szelest & Pawlak (2013), in human cognition, information processing takes the form of learning in five steps: perceiving, decoding, comprehending, structuring, and storing information constructions, which are considered key components of cognitive linguistic and functional theories of language. We learn constructions by using known language and adding new information from the context while engaging in communication. Thus, an individual's creative linguistic competence emerges from the collaboration of the memories of all the utterances in the individual's entire history of language use and from the frequency-based abstraction of regularities within them. Frequency (appropriate discourse), decency (selection based on cultural situation), and context are the three most fundamental influences on human cognition, both linguistic and non-linguistic. The more WM demands of a task, the more an individual will use memorized patterns and formulaic speech; the lower the working memory load, the more creative the individual's constructions might be. Thus, preferences encourage the adoption of constructions that are considered because of a dynamic process in which regularities and systems arise from the interaction of people's styles, brains, thoughts, societies, and cultures using languages (Ellis 2006).

As learning can occur at any place and in any situation, circumstance or time, the learner chooses the best practices for his learning process and develops these practices with each new update to him. (Reid,1987). According to behavioural learning theory, operant conditioning is an extension of general learning theory in which the operant conditioning refers to the human mind,

which emits a response or operant (a sentence or utterance) without necessarily observable stimuli. The operant is maintained (executed by reinforcement of learning behaviour). If a student is asked to retell a definition of any sound and is taught to tell it in a certain way, he is unable to tell it unless he has the same conditional behaviour as when studying it. Therefore, an interrupted student may be unable to speak unless he starts from the beginning or may not be able to speak unless he is given some words as help, although he can write the information correctly. The idea of speaking here is connected or reinforced by a learning style or learning habit that reinforces the production of language. According to Skinner (1958), verbal behaviour, like other behaviour, is controlled by its consequences. When the consequences are rewarding (the same conditions or learning habits), behaviour production is maintained and increases in strength. When consequences are negative or when there is a lack of reinforcement, the behaviour is weakened and eventually extinguished. Thus, a student must develop his learning mode, and learning occurs quickly if the same strategy of learning is used.

Working memory

Past research, as indicated in the following few lines, has shown that working memory capacity and students' learning preferences are key factors that affect learning outcomes. In the past few years, many studies have suggested the role of working memory in L2 skill development (Kormos, 2006). Working memory (WM) capacity determines individuals' ability to make good use of context to comprehend and produce words. The ability to selectively process and retain information in an accessible state

(working memory) is a critical aspect of learners' cognitive capacities. According to Engle (2002), nearly all of what must be learned and remembered must pass through working memory. Hence, the capacity and effective functioning of WM determines the rate and extent of learning. In addition to learning, working memory capacity predicts performance in a wide range of real-world cognitive tasks. Many studies have investigated the role of WM in developing language skills. For example, Gu and Wang (2007) investigated the role of executive working memory (EWM) in the listening process and its relationship with listening comprehension among Chinese EFL learners at the university level. Hence, WM is defined as the mental space in which important information is stored in a highly active state and is available for a variety of other cognitive processes (Baddeley and Hitch, 1974). It is "the ability to store and manage information in one's mind for a short period of time" and is important to allow learners to hold on to information long enough to use it, concentrate on instruction and avoid interruption in learning skills. This is the "brain system that provides temporary storage and manipulation of the information, necessary for such complex cognitive tasks as language comprehension, learning, and reasoning" (Baddeley, 1996, p. 556). In Miyake and Shah's definition (1999), WM is:

> those mechanisms or processes that are involved in the control, regulation, and active maintenance of task-relevant information in the service of complex cognition (p. 450).

WM includes the processes that encode, store, and manipulate this information. WM is distinguishable from other types of memories, including memory storage, iconic memory, and long-term memory (LTM). The focus here is on both WM and LTM. Whereas WM is temporary storage lasting seconds, information that is stored in LTM may last a lifetime. Many theorists view WM as a subset of knowledge in LTM that is currently activated (Cowan, 1995; Oberauer, 2002). Attempts have been made to determine the characteristics of working memory and how it is organized. The capacity to perform some complex tasks depends critically on the ability to retain task-relevant information in an accessible state over time (WM) and to selectively process information in the environment (attention). The greater the WM demands of a task, the more learners will use memorized patterns and formulaic speech; the less the WM load, the more creative their constructions might be (Kuiper 1996).

Mechanisms of working memory concerning language

When processing information, words are encoded inside WM by visual attention, which is strongly encoded if it is attached to motivation or concentration. Information is sent later or immediately to LTM, where accessibility is easier if the information is correctly encoded. Language is encoded in boxes in the mind. At the time of learning, full attention facilitates learners' retention of stored knowledge.

> Working memory is required whenever anything must be learned because learning requires manipulation of information,

interaction with long-term memory, and simultaneous storage and processing of information … Clearly, working memory plays a critical role in learning; it is where knowledge is constructed and modified and where information is processed for semantic encoding (Dehn 2008.p.92).

Baddeley and Hitch (1974) developed a commonly accepted model of WM components that was expanded by Baddeley (2000), as shown in the figure.
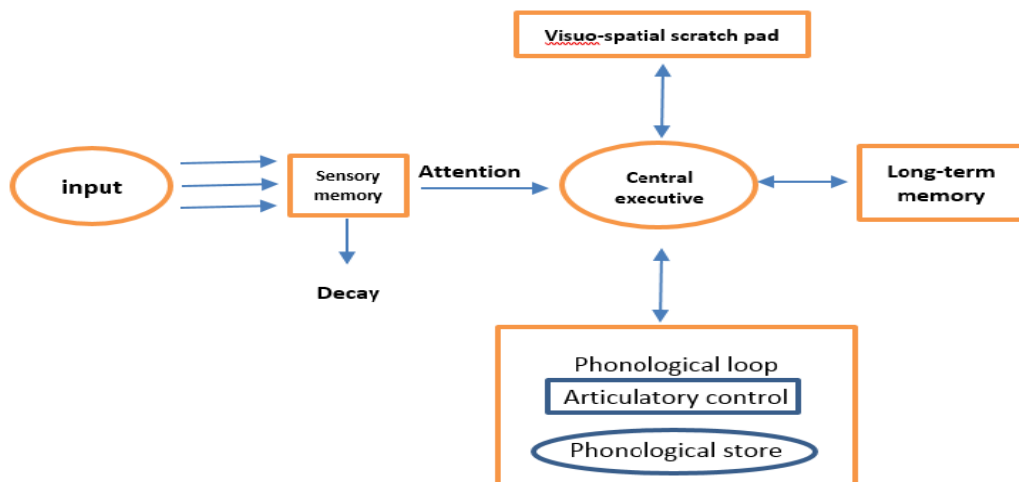

Figure (2) The Working Memory Model Components (Baddeley and Hitch (1974)

The model consists of a main central executive function that controls attention and processing through three subsystems: the phonological loop, the visual-spatial sketchpad, and the episodic buffer. Dehn (2008) states that the first central executive function is selective attention, which is the ability to focus on relevant

information while inhibiting disruptions. The second function is switching or coordinating several cognitive activities at one time. The central executive function can also allocate resources to other parts of working memory and temporarily retrieve, store, and manipulate intonation from LTM. The central executive function controls the phonological loop, a limited-capacity verbal storage subsystem. It is analogized as an audio-tape recorder loop of a certain length (Dehn 2008), in which orally presented verbal information is recorded until it decays or is recorded over by new auditory information. The phonological loop stores verbal information for 2 seconds or less unless the information is rehearsed or stored in LTM. The second subsystem is the visual-spatial sketchpad, which is responsible for processing and maintaining information that can be represented with visual or spatial characteristics. It plays a significant role in reading as it visually encodes print while maintaining a frame of reference that allows the learner to backtrack and keep his or her place in the text (Dehn, 2008). It also participates in the generation and manipulation of mental images. Like the phonological loop, information here is quickly forgotten unless it is rehearsed or stored in LTM. The episodic buffer, the third subsystem, is a temporary storage system that accesses LTM to construct representations based on additional information (Baddeley, 2000). It also encodes additional information into LTM. According to Dehn (2008), it combines visual and verbal codes (gained through senses or learning preferences) and links them to representations in the LTM.

Fig:(3) The Working Memory Model (Baddeley and Hitch,1974)

Although the terms short-term memory and working memory are often used interchangeably, the manipulation and integration of information to achieve a cognitive goal differentiates WM from short-term memory (Janold & Tow'se, 2006). For example, short-term memory can be tested by presenting participants with a series of visual-spatial or verbal items that must be recalled in correct serial order. The individuals must store the items for a brief time but are not asked to manipulate the information in any meaningful way. These assessments are often called simple span tasks. In contrast, working memory tests present participants with a series of items that they must maintain in storage while conducting additional processing tasks. Such tests are often called complex span tasks. Individuals who perform well on working memory tests can store information efficiently while rapidly processing and retrieving information to solve complex problems.

Encoded Language, Working Memory, and Recall of Knowledge

WM capacity directly impacts an individual's performance on cognitive tasks and, consequently, influences a student's performance in learning (Jarrold & Towse, 2006, p.40). Classroom practices are not adjusted to address WM problems, and students are not presented with ways to improve their WM capacity

(Davis,2011). The staff at the Faculty of Education Damanhour University have no available method to identify students who struggle with limited WM capacity. The maintenance and ordering of linguistic information both naturally form individual spoken language production planning. This information is categorized differently in several different points that the speaker plans to make, such as letters first followed by words within phrases, phrases within sentences or even expressions in dialogs. Regarding our learners, many of them can receive and understand the language, but they are unable to produce it or even give a correct response at the right time because their recall of knowledge is difficult, either because of a shortage or difficulty remembering words or their correct order spontaneously.

Thus, language production gains importance due to social factors and communication. Practically, once individuals learn a language, the actual time spent in speaking is more than any other skill. This creates a critical problem if they do not have the ability to produce the language needed. Gould (1978) suggested that planning takes two-thirds of the total composition time for both writing and dictation; hence, there is only a moderate speed advantage for dictation. Thus, speakers have less time to plan their language production unless they order words and phrases perfectly, which means they should have perfect linguistic competence and perfect WM when ordering and planning, recall of knowledge needed for a certain situation, and previously correct encoded information. Wagner et al. (2010) suggest that the amount of planning involved is determined by the cognitive load, complexity of the sentence and speed of speech. However, when

speakers are under time pressure, planning is more limited. In his theory, Levelt (1983) argued that speakers define their own speech errors by listening to themselves first and discovering that what they say sometimes differs from what they intended to say or listened to previously in the same situation. Dell (1986) proposed a spreading-activation theory based on connectionist principles. A representation is formed at each level. It is assumed the nodes within a network vary in activation or energy. When a node or word is activated, activation or energy spreads from it to other related nodes or words. Processing during speech planning occurs at the same time at all levels; it is parallel and interactive. The following figure represents the speech production chain. The three stages connect the role of learning style and WM for correct final speech production. Learning preferences help in correct conceptualization and increase the speed of encoding correct concepts of linguistic forms, which leads to the second step, in which correct forms are created in the short-term memory and pushed by an inner motivation of confidence about the previous two steps. This motivates the learner to speak what he has stored in his current WM. At this stage of utilizing knowledge, two factors affect the learner's preferences, by which he forms his own learning strategy: the mother is a social factor whose learning strategy is applied, and the teacher's strategy is also applied. If the two are parallel, the learner obtains correct WM and an appropriate learning strategy; if not, he will create his own strategy, which may be based on bad habits that lead to incorrectness in all previous stages of production.
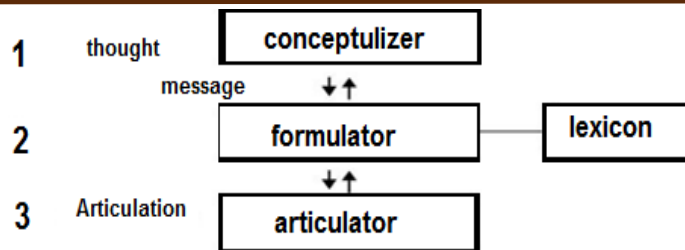
Figure (4) A simplified model of speech production, based on level (1989)

Individual Differences in Working Memory

Brady.et al (2009) suggests that *"the underlying capacity of the individual's working memory is unchanged, but the information they should remember can be encoded in a more compressed fashion."* In addition, "a large amount of information from the world is transmitted to the brain through the eyes, ears, and other sensory modalities*."* This indicates that real-world images are not randomly structured and, in fact, share many structural similarities that form a type of redundancy. Thus, the visual perceptual system takes advantage of this redundancy by tuning neural response characteristics to the natural image of the world.

The retrieval of this information gained through the senses depends on the capacity of WM to keep the maximum amount of these images. However, every learner receives information differently; thus, the image formed in WM differs with the learner's speed of retrieval or capacity to retain images of real life. This is the point of the relationship between WM and learning preferences. Redundancy (practice) is a way of encoding within WM that leads to greater capacity for storage or transfer to LTM as a pure learning

process. This means that the more redundant information is, the greater the capacity for retrieval is and the lower the speed of retrieval is. Learning preference is a core item that affects the encoding of information images inside the brain. Therefore, the type of redundancy created by learning preference is very important to keep this image in the working memory through attention given to the encoding process (coming from the learning preference). People can remember more words if these words make a coherent sentence than if they are randomly drawn from the lexicon (Simon, 1974). This is also true in memory for visual, auditory, and kinetic information. Thus, the phonetic coding scheme is not sufficient to capture how much information is in a string (stored in the WM in the brain as the conceptual content matters a great deal). Consequently, a lack of attention to speaking can lead to redundancy in the slots or chunks in WM. Applying the if: so, equation, visual learners can easily encode words phonologically; for auditory and kinetic learners, longer words take longer to articulate, providing more time for the memory trace to fade.

Learning Styles and Working Memory

Each person has a limit to WM, and this capacity remains relatively fixed and consistent over various occasions (Gathercole & Alloway, 2009). However, the variety of occasions and situations (i.e., the learning environment depending on style preferences) may lead to variety in an individual's ability to process information as well as to variety among learners in dealing with information. Some people process information quickly and efficiently, thereby reducing the amount of time information must be held in storage. Finally, differences in the central executive

system that coordinates both processing and storage may also lead to variances in WM that occur in high-level cognitive tasks during learning. Meaningful learning occurs when the learner appropriately integrates all his senses. Overall, teachers' view of the cognitive stages of learning can influence their decisions about how to design instruction (Mayer, 2005). Figure (5) shows how this can be understood in a learner's mind-map to achieve balance in learning materials and learners' preferences. In this model, short-term memory serves as the gateway by which information can gain access to LTM. The function of short-term memory is to provide a means of controlling and enhancing, via rehearsal and coding strategies (such as chunking), the information that makes it into LTM.
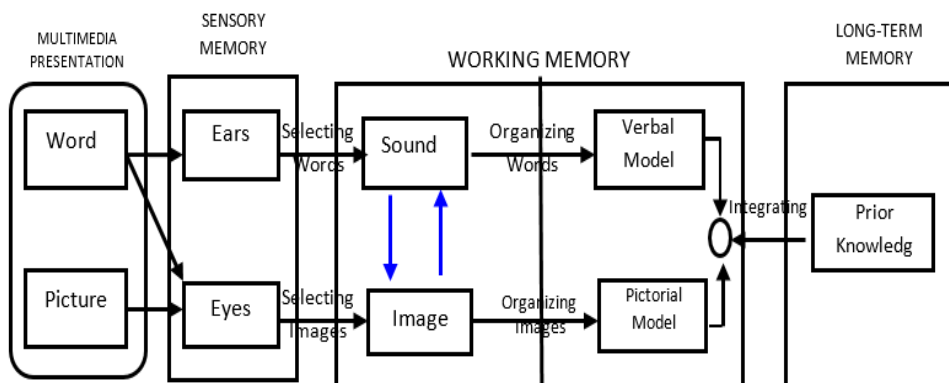

Figure. (5): Cognitive Theory of Learning (source: Mayer 2003 p.37)

Once an instructor helps learners know what they are to learn, the learners can focus on how to learn it well (Zheng, 2008). Cognitive learning theory explains how mental processes transform information received by the eyes and ears into knowledge and

skills in human memory. As represented in the figure, there are three important cognitive processes indicated by the arrows:

1. *Selecting words and images* —the first step is to pay attention to relevant words and images in the presented material.
2. *Organizing words and images* —the second step is to mentally organize the selected material in coherent verbal and pictorial representations.
3. *Integrating* —the last step is to integrate incoming verbal and pictorial representations with each other and with existing knowledge.

If the previous elements are combined, teachers can determine a relationship between learning style and increase the capacity of WM to help learners transfer information easily and quickly to LTM and facilitate the recall of information needed in daily communication. They can eliminate hesitation, repetition, or silence when students are asked a question, they understand but for which they are unable to recall the answer. They can maintain attention while learning instead of losing attention or motivation and being unable to complete tasks. Their fluency may improve, and they may better select expressions to improve their speaking skill. This is the core issue of this paper. For this reason, Dehn (2008) suggests that assessing WM should be an essential part of every assessment of learners' cognitive abilities.

Cohen (1997) provided a WM test battery that includes many items. The researcher has chosen some of these as the basis of this study. The verbal WM subsets are emphasized as they affect language learning and speaking skill. Verbal WM subtests are required when information is long, complex and needs to be

manipulated. Dehn (2008) wrote, "*Verbal working memory tasks also depend on knowledge and processes beyond working memory*" (p. 135). These subtests measure the verbal component of WM. They include memory of sentences, in which a sentence is read aloud, and the examinee is asked to recall the sentence, and memory of stories, in which, immediately after hearing a story, the examinee is directed to retell as much of the story as possible (Dehn, 2008). Reading span is found in most measures of verbal and executive WM (Dehn, 2008); the examinee reads a series of sentences and then, sequentially, recalls the final word in each sentence. Finally, listening span involves the examiner reading a series of sentences, followed by the examinee recalling the final word of each sentence (Dehn, 2008). The examiner makes the task more challenging by asking a question before the examinee recalls the final word in the sentence.
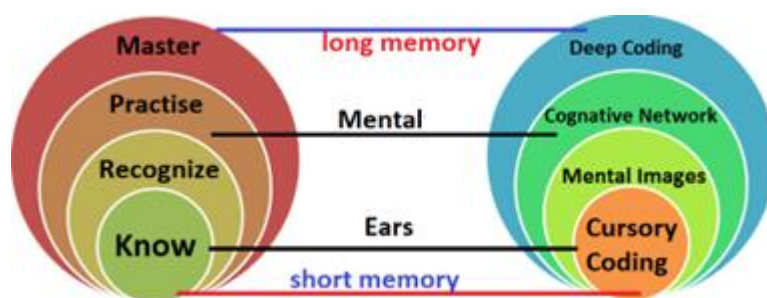

Figure (6): Suggested process of working memory and language learning

Clearly, WM plays a critical role in learning; it is where knowledge is constructed and modified and where information is processed for semantic encoding. Nearly all of what must be learned and remembered must pass through WM (Dohi,2008). In

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the first stage of learning, WM starts to cursorily code the information received from the learning environment through the senses using the preference the learner has available (in case of language learning, the ear is the main tool of WM). In this stage, the learner is only able to repeat or say the words. In the second stage, the mind starts to form images about this information and establishes (tight) relations between codes of knowledge (in the case of language, the mind can connect words by relations such as cause and effect, results, contrast (light/dark), time (day/night) or analogies (die/tie-see/ tree) around sounds and meanings). The first and second stages are placed in the short-term memory, which allows the learner to remember only in the learning context or in the situation of learning (short dialogues, short sentences, short answers). At the same time, the learner's preferences are still the only channel to the mind in the learning process. In the third stage, mental skills start to connect these codes in chunks to form a cognitive working network while the learner is practising using and applying the information to new contexts and simultaneously transferring the knowledge to the back-working memory to be stored for the next utilization. In the last stage, which is considered the level of language mastery, the learner starts the creative usage of language; he can produce poetry and prose and has a creative style. This creativity leads the learner to use language with sound coding to express inner feeling using only the tone of his words. The memory can store feeling and code it with words; thus, the learner can say "I'm happy" with tones representing that feeling or "I'm disgusted" with an appropriate tone.

This connection among codes results in relations among words that are transferred into principles that facilitate the retention of language knowledge (making relations with environment). This contributes to the use of the language easily or creatively in new situations. The more complex these relations and chunks are, the more difficult it becomes to forget. Consequently, the information becomes easier to remember and reuse in new contexts, which indicates creativity in language use. The human memory needs to have the same codes for communication and comprehension. If learners' and teachers' memory does not have the same codes, they cannot communicate. For example, within one family, there may be a guest who does not understand what is being said. The use of learning preferences increases the amount of motivation, which is the most essential element in learning. As SLA is a process of sequence learning, WM plays a significant role in the chunking process of these linguistic sequences and consequently influences vocabulary acquisition and grammar learning (Ellis, 1996; Ellis & Sinclair, 1996; Williams & Lovatt, 2005). Thus, it positively affects the fluency of language in terms of speaking. Therefore, senses representing learning styles act as a medium in the learning process.
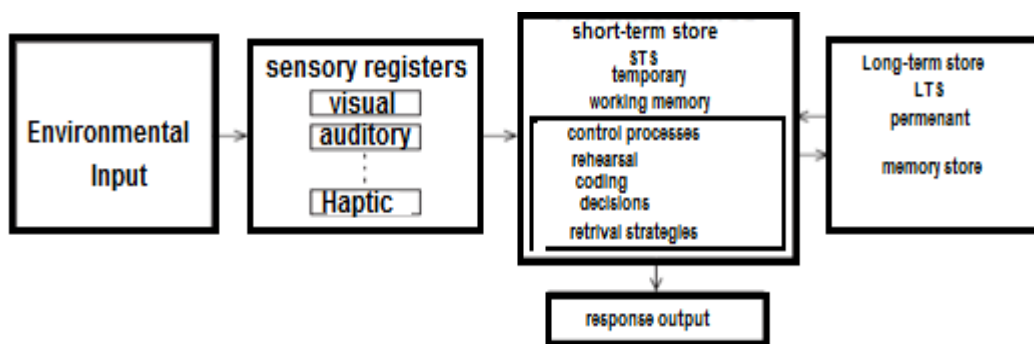
Figure (7): Smith & Kosslyn's (2007) flow of information from sensory

As shown in Figure (7), Smith and Kosslyn (2007) explain the flow of information from the senses as an input to LTM that must first pass-through working memory. Information from the environment is registered and encoded in WM by visual, auditory, and kinetic sensory receptors and then passed to WM. Information is rehearsed or otherwise manipulated before entering LTM. The same steps are passed in reverse when retrieving information from LTM to WM for reuse. Thus, information that is consistently, correctly, and appropriately received will be stored and consequently retrieved with the same consistency, correctness, and appropriateness. Retrieval depends upon the way information was received, stored, and maintained or manipulated inside the learner's mind. Regarding learning theories, each action, word, or idea occurs because of a strong motive. If learners willingly revive information, they have an inner motive to receive it. If they use strategies they prefer, they will store, maintain, and manipulate information well for its next retrieval in an analogous situation or context. However, some students receive information well but do not manipulate it well in the mind; thus, they cannot easily retrieve what they need at the appropriate time, and their responses are not suitable or are incorrect. As Crain et al. (1990) indicate, difficulties in comprehending spoken language may stem more from inefficiencies in verbal WM than from the failure to acquire critical language structures.

Methodology and Procedures

Aim of the Research

The aim of the present research is to define the role of WM capacity in speech production in terms of fluency, words, and accuracy of grammar use in addition to the way WM interacts depending on learning style. It also aims to represent the views of freshmen-class students in the Department of English, Damanhour University, regarding their own foreign language learning process. The study examines learners' learning styles and the relationship between learning preferences and WM capacity, which affects the spoken quality of the English language among freshmen students. Consequently, the study used the quantitative qualitative method to each the answers for questions.

Research Questions

The present study seeks to answer the following questions:

1. What are the learning preferences of 1st-year Faculty of Education Damanhour University students?
2. How the capacity of WM of 1st-year Faculty of Education Damanhour University students affected by learning style?
3. How working memory differences affect 1st-year Faculty of Education Damanhour University students' speaking fluency?
4. How working memory differences affect 1st-year Faculty of Education Damanhour University students' vocabulary use?
5. How working memory differences affect 1st-year Faculty of Education Damanhour University students' accuracy of the use of grammar rules?

Significance of the Research

The present research is important because it reveals the views of the freshmen students regarding their own foreign language learning process. In other words, this study enables students to evaluate their own foreign language learning process. In addition, this study sheds light on the influences of psycholinguistic factors on the foreign language learning process of freshmen English students. It provides valuable data for instructors to review and reform their foreign language teaching process in accordance with students' views. The use of WM tests does not help teachers predict students' current mental ability but may offer teachers more insight into students' current cognitive processing capacity or their verbal WM. Furthermore, it can assist teachers in determining how this factor may affect other areas of students' learning, such as pronunciation.

Research Limitations

The present research was limited to sixty freshmen students at the Department of English, Faculty of Education, Damanhour University, during the academic year 2015/2016. It is also limited to one of the productive skills, speaking, with a focus on three sub-skills (fluency, accuracy of the application of grammar rules and vocabulary). Regarding WM assessment, the study was limited to the central executive subset system and two linguistic fields, word length and sentence immediate recall tasks.

Participants

The population of the present study was freshmen students in the Department of English. First-year students were chosen as

they are all at the same level of language according to secondary schools' evaluation tests, but they were interviewed to ensure that they were all at the same level of oral performance. Accordingly, the sample of the research was 60 freshmen general department students, 48 females and 12 males. The participants had different English language education backgrounds. They came from different environments and vocational schools in the Damanhour governorate. Their speech samples were transcribed by the researcher and judged by four ratters who were PhD candidates. The ratters are asked to judge the participants' L2 oral performance considering grammatical accuracy, fluency, and vocabulary use. They judged the participants' accuracy on a scale of 0 to 5 following a rating scale for speaking skill (appendix 2). Considering group homogeneity, eighteen of the 88 participants who were submitted to the language selection process were excluded from this study due to their level of proficiency.

Research Tools

Three main Tools were used:

1. **Reading Span Test**: Fortkamp (1999, 2000) suggests that this type of test aims to measure individuals' WM capacity in L2 speech production. It was designed by the researcher to assess learners' WM. The test involved four levels with 2 sentences in the first level, three sentences in the second level, four sentences in the third level and five sentences in the fourth level. The sentences were simple and derived from daily life. The test administration took approximately 15 minutes per participant. In the first five minutes, the participants received

instructions from the researcher on how to complete the test. Then, they practised the test once in English in the following five minutes. The participants then began the real test. Each sentence was seen for 15 seconds on a PowerPoint slideshow prepared for the test administration. The participants were asked to respond on a prepared form. They were asked to remember the last word in the first level, two words in the second level, three words in the third level and four words in the fourth level of the whole sentence. One score was given for the correct given word in each sentence at all levels.

2. **Speaking Proficiency Scale**: Because the core concern of this research is learners' oral proficiency, an interview including 10 questions of high frequency in everyday conversations was administered to ensure that the participants were at the same level of proficiency in terms of their oral performance. Then, the ratings on each of the 5 scales averaged by the ratters are transformed into values in the weighing table. Students under 70% were excluded. Pearson's correlations, which were run between each of the four ratings in the proficiency test, proved to be significant (0.92), showing consistency among the ratings provided by the four different ratters and the researcher's scores. After three lectures of oral discussion about three guided topics in conversation lectures, each student was asked to give an oral presentation about the three topics, indicating information about the media used or methods of collecting data about the three topics. Four experienced ratters judged the presentation on a speaking proficiency scale to obtain the interviewee's total score. To guarantee sample homogeneity in terms of oral proficiency, advanced learner participants whose

scores were above 6 out of 15 were assigned to evaluation. Finally, 60 of 88 students were chosen to serve as participants in this research.

3. **Memletics learning styles inventory**: The third tool the researcher used was the seven-dimension Memletics learning styles inventory (LSI) free online version (1.2). The Memletics LSI is an online test consisting of 70 statements that the participant ranks on a 0-2 scale based on likeness. The inventory identifies seven learning styles and provides the participant with a score ranging from zero to 20 in each area, with a score of 20 indicating frequent use of that style. Only the first three dimensions, visual, auditory, and kinaesthetic, were used; the other dimensions were not related to the study scope. The inventory was programmed with Google Forms and was administered electronically to the sample.

Results and Discussion

The statistical results (using SPSS package) provide valuable data to understand learners' characteristics and to provide detailed explanations of the research. The statistical data can be interpreted as follows.

Concerning the first question, the researcher used the Memletics LSI free online version (1.2) questionnaire to determine the learners' learning style to choose the best learning strategies for the next three years. The results showed that three main categories were represented in the sample, namely visual, kinaesthetic, and auditory, but with different percentages. Thus, the percentage of visual learners is approximately 36.2%, the percentage of auditory learners is 34%, and the percentage of

kinaesthetic learners is 29.55%. There are not fully visual or auditory learners; instead, these were combined, with one of them being of a higher percentage than the other. These percentages indicate that most of the learners prefer watching or listening to videos or sound files. These styles are more suitable to language learning; O'Conner (1980) stated that learning starts with the ears. This means that learning in the next three years will mostly depend on YouTube or sound files for these learners. Another crucial point is that the types of learning styles are connected to types of production of language skills. For example, some students may stop saying a definition and return to the same point before switching back to discussion. Others may not be able to recall the information or keep the information in short-term memory for more than few seconds. The learning styles of students directly affect the foreign language learning process. Consequently, students use some strategies for success in the foreign language learning process during the submission of their assignments and discussions. Some of them watched videos or listened to sound files in addition to reading articles from the Internet during their language performance in other subjects, such as drama or literature. Since the participants are conscious and motivated in the process, they were able to develop and use personal strategies for success. This is the answer to question one in the research. The results indicate that asking learners to perform tasks under their chosen conditions can encourage them to produce more accurate and fluent language. Regarding the second question, the statistics revealed that no significant relation emerged in table (1) between students' learning style and their working memory capacity.

Table (1) Significance of students' learning style and their working memory capacity.

ANOVA

wm

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	22.644	2	11.322	1.846	.167
Within Groups	349.689	57	6.135		
Total	372.333	59			

Dohi (2008) notes that learners at the university stage are at their best level of WM and can quickly recall previously obtained information. Thus, the improvement in their performance may be related to other factors that were not the focus of the present study, such as feeling relaxed or feeling a lack of stress from evaluation.

Regarding the relation between skills and learning styles, the data has revealed potentially contradictory results. As shown in table (2), the results of the data analysis show significant differences between the mean scores of the interviews with freshmen learners before using their learning style in the three skills and the same learners after using their own private style to gain information in the total scores from the second evolution of their oral performance. Comparing the two interviews, the results reveal that the learners significantly improved in the second interview. Thus, their performance improved when they depended on their own learning style to gain information related to the topics, resulting in improvement in their spoken performance.

Table (2): Differences between both interviews in relation to speaking skills

Static values / skills	Interview (1)		Interview (2)		T	df	Significance levels	η^2
	X	S. D	X	S. D				
Grammar accuracy	2.733	0.709	3.350	0.708	3.083	59	0.01	0.138
Vocabulary	2.716	0.783	3.350	0.659	5.131	59	0.01	0.308
Fluency	2.866	0.964	3.350	0.546	5.286	59	0.01	0.321
Total scores	8.316	1.662	10.050	1.170	6.834	59	0.01	0.441

Concerning Vocabulary: Participants who show efficient WM have sufficient resources to recall the words they need to give the correct response at the correct time. In contrast, participants who show inefficient WM (i.e., lower scores on the WM test) have difficulty retaining target words due to insufficient WM capacity while speaking, although this is not documented to have any relation with their learning preferences. Hence, high-functioning students with greater WM capacity can retain more information that is necessary to complete a given task, such as speaking fluently, because they successfully utilize the efficient activation of semantic and syntactic information (Budd, Whitney, & Turley, 1995). This is the answer to research question three.

Table (3) Comparison of averages of vocabulary skill & learning styles

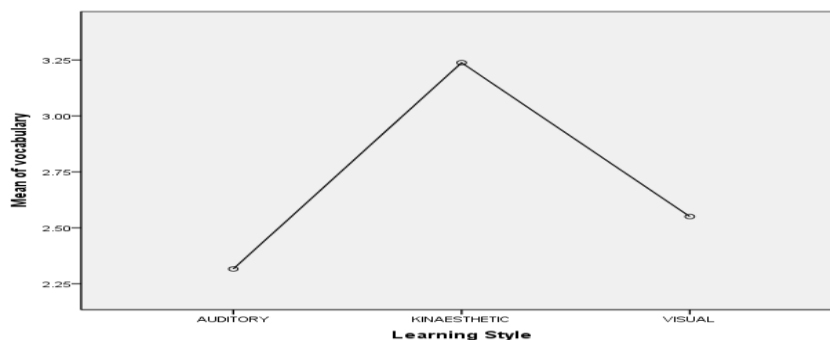|	**Auditory**	**Visual**	**kinetic**
Auditory	-		
Visual	0.234-	-	
Kinetic	**0.922-	**0.688-	-

significant at level 0.01

Fig (8): Comparison of averages of vocabulary skill & learning styles

Engle and Tuholski et al. (1999) note that WM capacity has significant relationships with vocabulary development.

Concerning the use of accurate *grammar rules* in the oral performance presentation, the crucial point to measure this dependent variable concerned the accurate use of the target structure. Other mistakes, if not related to the formal aspects of the target structure, were not taken into consideration, such as punctuation or spelling. However, some of the learners used

incorrect structure indicating subject verb disagreement, such as, *"This behaviour helps me to summary the important notes in syllable. It helps me to remember what study."* Others provided accurately structured sentences, such as, *"It helps me to answer the question in the exam very quickly."* They indicated that they preferred their own learning habits even if they were not correct, such as, *"Studying in the bed*." To elicit learners' performance in spoken English as whole, the researchers asked the learners to perform one oral presentation during the final closing session of the semester as the main holistic performance for students' language performance. The present research provides valuable data for the literature and people dealing with the field. The only issue that caused the students to hesitate was the fear of making mistakes. Thus, no significant effect was found concerning improvement in the use of grammar. This is the answer to research question four.

Fluency: Many researchers in speech production have noted that people differ widely in their speaking fluency. Students often have difficulty producing fluent speech simply because they lack the vocabulary or grammar to express what they want to express. They are highly motivated due to their ability to control their attention for the active maintenance of given information. Receiving data according to their preferences and inhibiting irrelevant information due to the ability to select from their working active memory in addition to the ability to provide correct appropriate responses is viewed as self-confidence, which enhanced their speaking fluency. This is the answer to research question three. Maclay & Osgood (1959) refer to the fact that "*what differentiates*

fast from slow speakers is not the rate of articulating words, but rather the number of hesitations between the words". Goldman-Eisler (1968) notes that hesitations can vary in speaking time across individual speakers. In addition, hesitations occur before the first content word of a phrase or sentence (Tannenbaum, Williams, & Hillier, 1965). This suggests that individuals may differ in the fluency with which they can retrieve the precise context-appropriate word when they speak. Individuals who have a greater capacity to coordinate the processing and temporary storage requirements of speaking are more verbally fluent.

Table (4) Comparison of the total scores of speaking skill & learning styles

	auditory	**visual**	**kinetic**
Auditory	-		
Visual	**0.371-**	-	
Kinetic	****1.754-**	***1.383-**	-

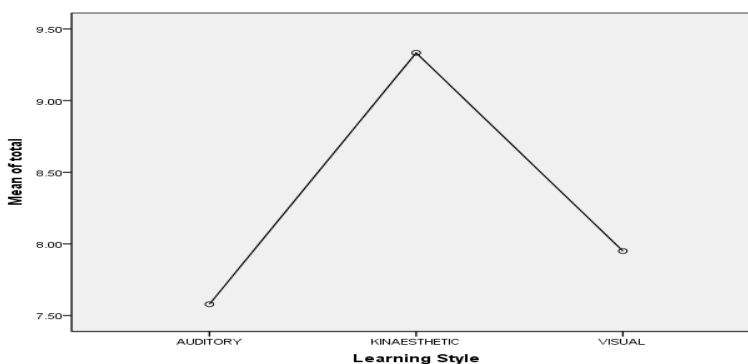significance level 0.01   significance level 0.05

Figure (9): Comparison of averages of total scores & learning styles

As shown in Table (4) and Figure (9), there are differences between the averages of the auditory and kinetic learning styles as well as the visual and kinetic learning styles in vocabulary skill in favour of the kinetic learners. There are no statistically significant differences between learners' learning styles (audio, visual, and kinetic) in both the grammar and fluency skills (*f*) = (0.943 and 1.954), and this was not statistically significant.

Table (5) The (f) value for the analysis of variance and the level of significance of the differences between the of learning styles (audio, visual and kinetic) in the speaking skills & the total scores.

	variance	Sum of squares	df	Mean squares	(*f*) value	sig
Grammar	Between groups	0.953	2	0.476	0.943	No Significance
	Inside groups	28.781	57	0.505		
	total	29.733	59			
Vocabulary	Between groups	9.319	2	4.659	9.886	0.01
	Inside groups	26.865	57	0.471		
	total	36.183	59			
Fluency	Between groups	3.524	2	1.762	1.954	No Significance
	Inside groups	51.409	57	0.902		
	total	54.933	59			
Total scores	Between groups	34.735	2	17.368	7.719	0.01
	Inside groups	128.248	57	2.250		
	total	162.983	59			

There are statistically significant differences among students' learning styles (audio, visual and kinetic) in the vocabulary and the total score, with a value of $(f) = (9.886, 7.719)$ at the level of significance (0.01). Table (5) shows the averages and standard deviations in speaking skills in relation to learning styles.

Table (6) Mean averages and deviations in speaking skills according to learning styles

Descriptives

		N	Mean	Std. Deviation
accurasy of grammer	a	19	2.6316	.59726
	k	21	2.9048	.76842
	v	20	2.6500	.74516
	Total	60	2.7333	.70990
fluency	a	19	2.6316	.59726
	k	21	3.1905	1.32737
	v	20	2.7500	.71635
	Total	60	2.8667	.96492
vocabulary	a	19	2.3158	.47757
	k	21	3.2381	.76842
	v	20	2.5500	.75915
	Total	60	2.7167	.78312
total	a	19	7.5789	1.01739
	k	21	9.3333	2.08167
	v	20	7.9500	1.09904
	Total	60	8.3167	1.66206

The learners indicated that they had their own learning habits that helped them in their studying. Learners reported the following habits:

S1: It helps me concentrate more and not to be interrupted by anything. Additionally, the time limit idea; it helps me not to waste time in one point without moving to the other. That is, it, I think.

S2: It helps me to remember the answers when I was in the exam. Because writing notes during studying helped me to remember the information in the exam.

S3: It helped me in memorizing the lesson in my mind, helped me to think effectively and understand the lesson well, knowing it well

Thus, the greater percentage of improvement may be due to the learners' own learning habits, which may be investigated by other studies.

Working Memory, the results for WM provided surprising answers to questions four and five in relation to speaking skills. As shown in Table (6), no significant relations were found for learning styles and WM or for speaking skills and WM.

Table (7) correlation between speaking skills and working memory

Correlations

		wm
accurasy of grammer	Pearson Correlation	.231
	Sig. (2-tailed)	.075
	N	60
fluency	Pearson Correlation	.138
	Sig. (2-tailed)	.295
	N	60
vocabulary	Pearson Correlation	-.059-
	Sig. (2-tailed)	.655
	N	60
total1	Pearson Correlation	.151
	Sig. (2-tailed)	.250
	N	60
wm	Pearson Correlation	1
	Sig. (2-tailed)	
	N	60

Daneman and Green (1986) proposed that WM capacity is an important source of individual differences in the speed and ease

with which people can use their native language. The ability to selectively process obtained information and to recall it in an accessible state (working memory) are critical aspects of people's cognitive capacities. According to the results of the WM test, almost half of the students at this level have a prominent level of verbal WM. Only one student scored 29 on the test, whereas the rest of the class scored more than 30 points. Although the results of the reading span test did not show significant correlation with students' WM scores, the test revealed significant information, as shown in Table (7). For example, students who had high scores on the reading span task did not perform as well as some students who scored lower in the same test. They gave responses such as, "I forget everything," but once they started talking, they made mistakes such as, "*As I believe that the person needs to repeat what he studies and knows to **remember** himself by it and also I remember the things by **remember** the situation I was in it*". Additionally, students who did not receive points for recalling short sentences were able to recall longer sentences. Hence, it is likely that the sentences used in the speaking task needed to be revised to make these long sentences more difficult in an attempt to explore whether students' ability to recall long sentences instead of short ones was derived from their cognitive processing ability or their WM. Speakers with small WM capacities were found to be much slower or less fluent at producing a context-appropriate lexical replacement for the target word than were speakers with larger WM capacities. Processing speed heavily influences WM because memory processing and storage are time related (Swanson, Howard, & Saez, 2006). The speed of response is

evidence of improvement in performance. Faster processing speed allows more information to be processed in less time, thereby increasing the functional capacity of WM, and resulting in fluent speech or fluent linguistic performance. Faster speed also reduces the interval during which information must be maintained, resulting in less forgetting. Other ways that faster processing speed enables WM processing and storage are by making it possible to shift more rapidly between competing tasks; talking and interrupting others or being interrupted during talk, such as surfing ideas and returning to the same point; increasing the speed at which perceptual information is encoded into a memory representation more clearly in visual students, who receive information and store it without going through the entire process of transferring information to LTM; increasing the speed at which long-term memories are activated and retrieving and returning the information; and increasing the speed of associative learning, and increasing response speed to present fluent spoken language as a whole performance.

In cognitive psychology, it is relatively well accepted that individual differences in first language use may indicate individual differences in WMC, which in turn transfer these differences to the second language, which is greatly affected by L1 in learning L2. During the performance of cognitive tasks, WM, as a human cognitive system, has a role in the processing and storage of information (Baddeley & Hitch, 1974; Daneman & Carpenter, 1980; Miyake & Shah, 1999). This process of WM combines storage with the processing and manipulation of information. Thus, working memory has a more essential role in cognitive

activities such as comprehension, reasoning, and learning (Baddeley, 2000). The relationship between WMC and L2 speech performance has been a controversial issue, and research in this area has revealed opposing results. The results of the present research match those of D'Ely (2004), who showed a relationship between WMC and L2 performance in different areas, one of which was speech production. He did not find significant correlations between WMC and fluency, whereas Fortkamp (2000) did. Mizera (2006) examined the relationship between WM and L2 fluency and found weak correlations between WMC, speed and monitoring, and no other correlations between WMC and accuracy, pausing and repetitions. Guara-Tavares (2009) explored the relationship between WM and speaking skill and found a correlation between WM and learners' fluency and accuracy. Greater WM capacity has also been found in some studies of L2 speech to facilitate word retrieval and speech formulation, as revealed in faster, more accurate speech (Fortkamp, 1999; Kormos, 2006).

Other studies provide contradictory findings and find no such association between WM and L2 proficiency, especially for grammatical accuracy and oral fluency (Mizera, 2006; Sagarra, 2000). A recent study investigating these conflicting findings was conducted by Gilabert and Muñoz (2010), who investigated whether differences in WM capacity explained differences in oral performance, including fluency, complexity, and accuracy for high- and advanced-level Spanish learners of English. Their findings showed weak but positive significant correlations between WM and both fluency and lexical

complexity. However, they noted that there was no correlation with grammatical accuracy and that the correlation with fluency disappeared when the group was split between higher proficiency and lower proficiency levels.

Conclusion

For many years, there has been discussion of the characteristics and necessities of an effective foreign language learning/teaching process. This is a complex process. Theories, approaches, and methods continue to attempt to define this process. The outcomes of studies conducted in the field show that psycholinguistic factors have a positive or negative influence on the foreign language learning process. The present study provides evidence of the involvement of WM with vocabulary building but not with grammar and fluency. Processing speed heavily influences WM as memory processing and storage are time related; faster processing speed allows increased response speed and fluency. Improvement may be because participants' exposure to English during their studies was insufficient or perhaps overly passive with an emphasis on academic listening, reading, and writing only rather than speaking. It is possible to explain the complexity of foreign language learning by means of psycholinguistic factors and learning style, which suggests the need to adopt more innovative learning strategies. The results indicate that WM efficiency during speaking is not related to learners' preferred learning style. Thus, other factors may need to be determined, and other learning strategies may need to be attempted.

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