Enhancing vocabulary learning through understanding the human memory system: Episodic memory

(العرضية الذاكرة :البشرية الذاكرة نظام فهم خلال من المفردات تعلم تعزيز)

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Abstract

Vocabulary acquisition in learning languages is a crucial aspect of language learning, and effective teaching theories are essential for the retention and application of new vocabulary. However, understanding the memory system is important for educators to design and implement effective vocabulary teaching strategies that support student learning and retention. This article provides a comprehensive overview of the human memory system, including sensory, short-term, and long-term memory, with a focus on the differences between semantic and episodic memory. It explains the impact of episodic memory on vocabulary recall. In addition, it puts forward two teaching theories that enhance the utilization of episodic memories. Experiential Learning and Elaboration Theory focus on connecting vocabulary with personal experience for episodic memory and using previous knowledge to help students remember new vocabulary.

Keywords: Memory system, vocabulary learning, episodic memory, long-term memory.

مُلخَص

نظريات التدريس الفعالة ضرورية للاحتفاظ بالمفردات الجديدة وتطبيقها. ومع ذلك ، فإن فهم نظام الذاكرة مهم للمعلمين لتصميم وتنفيذ استراتيجيات تدريس المفردات الفعالة التي تدعم تعلم الطلاب والاحتفاظ بهم. تقدم هذه المقالة نظرة عامة شاملة على نظام الذاكرة البشرية ، بما في ذلك الذاكرة الحسية وقصيرة المدى والذاكرة طويلة المدى ، مع التركيز على الاختلافات بين الذاكرة الدلالية والذاكرة العرضية. يشرح تأثير الذاكرة العرضية على استدعاء المفردات. بالإضافة إلى ذلك ، فإنه يطرح نظريتين تعليميتين تعززان استخدام الذكريات العرضية. يركز التعلم التجريبي ونظرية التفصيل على ربط المفردات بالخبرة الشخصية للذاكرة العرضية واستخدام المعرفة السابقة لمساعدة الطلاب على تذكر المفردات الجديدة

كلمة الدليلة :نظام الذاكرة للاحتفاظ بالمفردات والذاكرة طويلة المدى والذاكرة العرضية.

Introduction

Vocabulary learning is an essential part of learning a language because it is the basic building block of any language, and it is vital for understanding and communicating. Remembering vocabulary is one of the challenging tasks students face while learning a language, and teaching them to remember can be even more rigorous. Every teacher must understand the memory system because it helps them to design and implement effective teaching strategies that support student learning and retention. The human memory system is a complex and multi-faceted process that involves the encoding, storage, and retrieval of information. The three main types of memory are sensory, short-term, and long-term memory. Sensory memory is a brief, immediate record of sensory information such as visual and auditory stimuli. Short-term memory, also known as working memory, allows for the temporary storage and manipulation of information. Long-term memory is responsible for the permanent storage of information and can be further broken down into declarative and non-declarative

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memory (Atkinson & Shiffrin, 1968). The non-declarative memory includes skills and habits that are performed automatically while declarative memory includes memories that can be consciously recalled, such as semantic memory and episodic memory. Semantic memory refers to our general knowledge about the world, including concepts, meanings, and facts that are not tied to a specific time or place. For example, knowing the capital of France (Paris), the meaning of the word "book" or the fact that dogs are mammals are all examples of semantic memory.

Episodic memory is the ability to remember unique past events (Tulving, 1983). This type of memory receives and stores information about the context in which an event occurred including what happened, where, and when. In humans, episodic memory develops around the age of 4 (Riggins, 2016) and declines with advancing age (Gaesser et.al, 2015). For example, remembering your first day of school, your wedding day, or a vacation you took are all examples of episodic memory. Episodic memory is intricately linked to our sense of self and allows us to remember our personal past experiences. Nikolaev et al., (2023) divided memory into two large contrasting systems where knowledge is captured by semantics and experience is captured by episodic. If the intensity of the experience is high, then it is likely that the corresponding knowledge or information will be more easily retained in memory. Although he conceded that while some processes, such as selective information intake and retention from perceptual systems and information transmission to other systems, are likely shared between episodic and semantic memory, there are enough differences to consider them as separate entities. Tulving believed that the information and representation format of the systems were fundamentally different; he saw episodic memories as dependent on spatial and temporal relationships, while semantic memory was based on concept-based, meaning-associated relationships (Brigard et al., 2022).

The purpose of this study is to conduct an extensive review of the memory system in humans, focusing on both semantic and episodic memory. Additionally, the study aims to investigate how episodic memory can be utilized to improve vocabulary retention in a classroom setting. Two theoretical frameworks are presented that proposes the connection of new vocabulary with personal experiences to enhance episodic memory. By exploring the potential benefits of these theories, this study aims to provide insights into effective methods for improving vocabulary learning and retention in educational contexts Finally, we discuss the potential implications of this literature review for broader topics related to the application of methods that help students remember vocabulary easily through theories that support episodic remembering.

Methodology

A narrative synthesis is an approach used systematically to collect and combine data from multiple studies. First, the relevant studies about the topic are summarized and interpreted individually. The studies are assessed for their quality, and the relationships between the studies are explained. The information from the studies is synthesized to develop an overall understanding of the topic. One way to present the information gathered during a narrative synthesis was to use a diagrammatic representation, which can help to summarize the study overview of the memory system. In addition to the narrative synthesis, based on the review of the literature and the researcher's understanding of the memory system, two theories were formulated. These theories aimed to provide a more comprehensive understanding of how the memory system works and how it can be studied in different contexts. These theories may provide a useful framework for future research in this area.

Theoretical Framework

The Memory System: Semantic and Episodic

Episodic and semantic memory are two processing systems that receive information from the perceptual system. The nature of storing information is a cognitive and autobiographical reference. Endel Tulving first founded episodic memory to refer to the ability to remember things based on personal experience (Tulving, 2001). Since then, the concept has developed considerably. It is called autographic memory. This type of memory is necessary to remember important events in human life that emotion affects. We can remember the date, how we felt, and the word we expressed. Such first day of school, the moment you fall in love, or what you had for dinner yesterday (Tulving, 1983).

In his recent work, Tulving argued that activating episodic memory is retrieving information from a person's experience and perspective. For example, episodic memory does not mean remembering your first day of class but also

remembering the experience in the class for the first time (Tulving, 2002). Retrieving information in episodic memory results in people remembering what they experienced, which can be recognized as self-awareness. Episodic memory also can be knowledge and skill and the same time. For example, swimming is a personal experience and a skill simultaneously. The degree of accuracy in remembering an event in episodic memory relies on access to the context in which the event happened. The context is the physical surrounding in which the event happened (Nikolaev et al., 2023).

Two critical factors of context that affect episodic memory are the time and the location of an experience (Gershman & Daw, 2017). Episodic memory has a set of unique operations to organize, store and retrieve information. It is temporarily organized; in another way, it is like a movie, and the person is in it. One of the characteristics of episodic memory is to recall information from the experience of the event. They often report as "I remember the accident" Tulving considers this kind of experience self-knowing awareness (Tulving, 2002). Episodic memory is not only capable of recalling past experiences, but also it can time travel to the future. This feature is exclusive only to episodic memory. It is not possible for other kinds of. Emotion is another important factor that affects episodic memory; they are part of an episodic memory system. One's emotion can act as a retrieval cue to access knowledge. However, the stronger the emotion when the event is experienced, the better the retrieval. Emotional events are generally easier to remember than non-emotional events. People reported that the extremely emotional experiences that are a part of trauma are often difficult to forget.

Conway et al., (1992), and Debra and Herbert (2001) have extended Tulving's memory awareness constructs to real-world learning situations and investigated how information processed during specific learning episodes, such as university lectures, can become conceptual knowledge over time. Initially, knowledge is retained in episodic form, which students can remember specifically. However, as learning progresses, these memory representations shift from being primarily episodic to being more conceptual, generalized knowledge that students simply know.

On the other hand, semantic memory refers to the general knowledge that we know, whether it is about concepts, facts, or beliefs (Martin & Chao, 2001). Semantic knowledge is independent; it does not refer to any circumstances which were originally acquired. For example, the knowledge the ball is round is a semantic memory, whereas the time and place you played with a ball are considered an episodic memory. According to Jones et al., (2014), model I semantic memory stores information like computers. In his model, each word is stored with links to another word. For example, if what is stored for canary in our brain is the yellow bird that can sing, then the two words that are linked to it are yellow and singer. General information about the bird which is flying feathers are not stored separately for each kind of bird. Instead, the fact is canny is a bird so that all birds can fly. This mode is called a hierarchical model of semantic memory (Collins, & Quillian, 1967). The links in this model formed a hierarchical tree structure, with a top-down classification of animals into subcategories (e.g. birds, fish). This structure enabled the model to explain both general concepts and specific information in a single framework. Accessing knowledge required navigating the tree to the relevant branch, and the model was effective in explaining human performance in early sentence verification tasks (such as quickly confirming "a canary can sing").
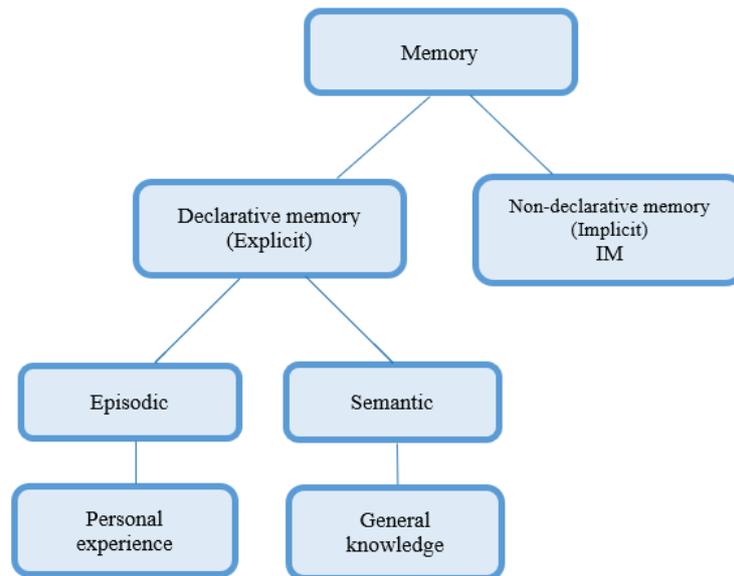
Figure 1. Schematic descriptions of the system of memory

Neuroscience of Semantic and Episodic Memory

Studying the affected brain area of a patient is the most efficient way to determine the function of specific activities in the brain (Debra. Herbert, 2001). The damage to the areas surrounding the hippocampus including the hippocampus and surrounding regions, including the para hippocampal gyrus, the entorhinal cortex and the temporal lobe can result in episodic memory loss as it has been observed in a patient with alzheimer's disease who cannot recall a personal experience of an event. As semantics requires the representation and recollection of spatial locations, the left prefrontal cortex is likely to be involved in remembering information (García-Lázaro et al., 2012).

On the other hand, semantic memory involves the identification of the objective. Neuroscientists have not yet proposed a consensus analysis. However, patients with damage to the temporal lobes often have difficulty naming objects and retrieving information about object-specific characteristics (Gershman & Daw, 2017). This suggests that object-specific information may be stored, at least in part, in the temporal lobes. Recognizing this location has been done through patients with a semantic impairment which they called semantic dementia. The term semantic dementia is used to describe patients with semantic impairment. They lose the ability to recognize familiar objects and people so what they say is

characteristically empty. They are fluent in graphology and syntactic structure (Martin & Chao, 2001).

Tulving demonstrates a model of memory for remembering or recalling information. He said our cogitative memory system consists of 4 types: perceptual presentation, working, semantic, and episodic memory. He argued that information is stored in the cogitative system serially. However, information can be stored in diffirent memory systems separately and can be retrieved interdependently without the effect of retrieval information (Tulving, 2002). That is why patients with episodic memory deficits might still remember semantic information. Patients with semantic dementia have difficulty performing any task that requires semantic knowledge. For example, picture naming., matching, describing words, and selecting living or non-living creatures. On the other hand, other cogitative systems were noneffective, such as working memory and episodic memory (Graham, et al 2000).

Influence of Episodic Memory on Vocabulary Recall

There is a consensus among researchers that acquiring vocabulary is crucial for effective communication in an English as a Foreign Language (EFL) setting. It has been stated that without a strong vocabulary, no information can be conveyed or communicated (Wilkins, 1972; Folse, 2004). Folse (2004) also highlights the

frustration of not being able to express oneself because of a lack of vocabulary. Several researchers including Laufer and Nationa (2016), Nation (1991), and Rodríguez and Sadowki (2008) have recognized the importance of acquiring vocabulary for the effective use of a second language and for producing complete spoken and written texts. In both English as a second language (ESL) and English as a foreign language (EFL), vocabulary acquisition is considered crucial for all language skills, including listening, speaking, reading, and writing. Laufer and Nationa (2016) argued that an adequate vocabulary is essential for successful second language use because, without it, learners may not be able to use the structures and functions they have learned to communicate effectively. Therefore, it is important for students to continuously improve their vocabulary skills and expand their word knowledge. For vocabulary to be recalled easily, it has gone to long-term memory (Cowan, 2008).

Vocabulary recall is a process of retrieving words and their meaning. The process of vocabulary recall involves encoding new information about a word in the brain and storing it in memory. In the storing stage, episodic and semantic memory are involved; when one of them stores personal information, another one which is semantic stores general information. Later to retrieve vocabulary, the cues are used to trigger recall, searching the memory for the stored information, decoding the retrieved information, and rehearsing the word to consolidate the memory (Laufer & Nationa, 2016). Different parts of the brain are involved in each step, including the auditory and visual cortex, the hippocampus, and the neocortex. Rehearsal helps to strengthen the connections between the brain regions involved in vocabulary recall, improving future recall.

Fansury, & Januarty (2018) mentioned that semantic and episodic memory have an effective role in recalling vocabulary. Episodic memories are associated with specific contextual information. The sensory experiences and emotions a student experiences during a lesson become a part of the memory. These sensory and emotional cues can be triggered when attempting to recall the memory, but sometimes the context is remembered more easily than the actual information learned. Through context and emotional cues, the actual information can be recalled easily. However, to recall vocabulary easily teachers must incorporate the sensory and emotional experiences of students to remember them easily. According to Um et al. (2012), positive emotions can facilitate learning and

contribute to academic achievement. When students experience positive emotions, such as interest, enjoyment, and satisfaction, while engaging with learning materials, they are more likely to be motivated to learn and remember the material.

The Theories That Support Students' Episodic Memory to Recall Vocabulary

1. Experiential Learning Theory

Experiential Learning Theory (ELT) emphasizes the central role that experience plays in the learning process. It provides a holistic model of the learning process and a multilinear model of adult development and is based on the works of Dewey, Lewin, and Piaget. Experiential learning is the process whereby knowledge is created through the transformation of experience (Kolb, 1984). ELT differentiates itself from other learning theories by emphasizing the importance of subjective experience in the learning process and by providing a hands-on, participatory approach to learning that helps students connect new information to their own experiences. Affective factors could affect language learners. For example, motivation and learner autonomy are two important factors that could affect the process of learning a language. In language education, it's important to help students become independent learners (Yildiz & Yucedal, 2020). By incorporating students' real-life experiences into the classroom, ELT can lead to a more meaningful and relevant learning experience, improve engagement and motivation, and the development of important skills such as problem-solving, critical thinking, and collaboration (Roberts, 2006). This theory involves four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation. Concrete experience is the direct engagement or experience in an event or activity such as a field trip, or hand on project. Reflective observation students will reflect and observe the event. Abstract generalization is students analyze the information that got from their experience. The last step is active experimentation. Students apply the experiment and the theories that they have learned throughout the direct experience (Kolb, 1984).

According to Herbet and Burt (2004), episodic learning is in every sense experiential learning due to capturing and storing memories in the form of complete episodes, which include a connected set of sensory information. This type of learning is truly experiential, as it has a greater impact on the student. In addition, the

Experiential Learning Theory (ELT) has been shown to enhance episodic memory, particularly in the recall of vocabulary. This is because ELT emphasizes the role of personal experience in the learning process (Simon, et al., 2000). When students learn vocabulary within a specific time and context, it has been demonstrated that the information is more likely to be encoded in long-term memory and then subsequently retrieved from episodic memory. By connecting new vocabulary words to personal experiences and actively engaging in the learning process through hands-on and participatory experiences, students are more likely to remember the information in the future. ELT's four-stage process, which includes concrete experience, reflective observation, abstract conceptualization, and active experimentation, provides a comprehensive approach to learning that can aid in the formation of strong episodic memories (Gershman & Daw, 2017).

2. Elaboration Theory

Elaboration Theory is a cognitive learning theory that suggests learners are more likely to remember and recall new information when they engage in elaborative encoding processes. Elaborative encoding refers to the process of creating meaningful associations between new information and existing knowledge or experiences. Elaboration theory was first introduced by Charles Reigeluth, an educational psychologist, in the 1970s. Reigeluth was interested in understanding how learners can create meaningful connections between new information and their existing knowledge and experiences, and how this process can enhance learning and memory. According to Reigeluth, elaboration involves learners actively engaging with new information and transforming it in some way to make it more meaningful and memorable. This can involve a variety of strategies, such as creating associations with other concepts, asking questions to clarify understanding, and organizing information into meaningful categories or hierarchies (Reigeluth & Stiein, 1983).

Reigeluth's work on elaboration theory was influenced by earlier theories of learning, such as Ausubel's theory of meaningful learning and Bruner's theory of scaffolding. However, Reigeluth expanded on these theories by emphasizing the importance of active engagement and transformation of information, rather than simply acquiring it passively. Elaboration theory has been applied in a variety of educational contexts, including classroom

teaching, instructional design, and educational technology. Researchers and practitioners have developed a range of strategies for promoting elaboration in learners, such as concept mapping, reflective writing, and project-based learning (Wilson & Cole, 1992).

However, elaboration theory suggests that memory is enhanced when learners actively engage with the material they are trying to remember. In the case of vocabulary, this means that students are more likely to remember a word if they can connect it to their own experiences or knowledge, or if they can create associations with other words or concepts (Taylor & Hamdy, 2013). This connection between new information and prior knowledge can be achieved through hypermedia. Hypermedia can include text, graphics, audio, video, and other interactive elements, and is commonly used in educational settings. People's professional approach to solving problems can be arranged into information. Professional supervision and progress have made this feasible. Guidance activities are individual-focused (Bilgin et al., 2022). Teachers' biggest challenge is keeping students' attention therefore to connect new information with prior knowledge, teachers can use several strategies (Kapukaya & Yildiz, 2023). Language teachers can improve awareness, engage language knowledge, relax, and motivate pupils by using extracurricular activities as warm-ups. Warm-ups can be done at the beginning, middle, and end of a language lesson to assist pupils focus (Tosun & Yildiz, 2015). First, they can ask students to recall what they already know about the topic before introducing new information. Second, teachers can relate the new information to real-life experiences to help students understand how it applies to their lives. Third, teachers can use analogies and metaphors to explain new concepts in terms of something familiar to students. Fourth, teachers can break down new information into smaller, more manageable pieces that build on students' prior knowledge. Finally, teachers can provide opportunities for students to reflect on what they have learned and how it connects to their prior knowledge, which can help to reinforce the connections and make the information more memorable (Hoffman, 1997).

Discussion

Theories of experiential learning and elaboration theory both support the idea that students' episodic memory can be enhanced when learning vocabulary. Experiential learning theory (ELT)

emphasizes the importance of connecting new information to personal experience and provides a hands-on approach to learning. ELT suggests that by engaging in a four-stage process that includes concrete experience, reflective observation, abstract conceptualization, and active experimentation, students are more likely to remember the information. ELT has been shown to enhance episodic memory, particularly in the recall of vocabulary.

Elaboration theory suggests that memory is enhanced when learners actively engage with the material they are trying to remember. For vocabulary, this means that students are more likely to remember a word if they can connect it to their own experiences or knowledge, or if they can create associations with other words or concepts. This connection between new information and prior knowledge can be achieved through strategies such as concept mapping, reflective writing, and project-based learning. Hence, prior knowledge aids learning. Teaching new concepts using students' prior knowledge improves engagement and critical thinking. Learning requires building on prior knowledge (Yildiz & Celik, 2020).

Both theories suggest that students need to be actively engaged in the learning process to enhance their episodic memory of vocabulary. This can be achieved by incorporating real-life experiences into the classroom, using interactive multimedia tools, and creating associations with prior knowledge. By enhancing episodic memory, students are more likely to remember vocabulary in the long term, which can improve their communication skills and academic performance.

In conclusion, experiential learning theory and elaboration theory both offer valuable insights into how students' episodic memory can be enhanced to recall vocabulary. These theories emphasize the importance of active engagement, personal experience, and meaningful connections between new information and prior knowledge. By incorporating these principles into teaching practices, educators can enhance students' episodic memory and improve their ability to recall vocabulary.

Conclusions

The neuroscience of semantic and episodic memory and the theories of experiential learning and elaboration provide valuable insights into how to enhance students' episodic memory for vocabulary recall. Episodic and semantic memory play a crucial role in learning and vocabulary acquisition, which in turn impacts effective communication and academic performance of students. Both theories emphasize the importance of active engagement, personal experience, and meaningful connections between new information and prior knowledge in the learning process.

To improve students' episodic memory for vocabulary recall, educators can incorporate pedagogical practices based on experiential learning theory and elaboration theory. These practices may include connecting new words and concepts to personal experiences, using interactive multimedia tools, and encouraging the creation of associations with prior knowledge. By doing so, educators can help students consolidate information into their episodic memories, which facilitates long-term retention and retrieval of vocabulary.

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