YOUNG EFL LEARNERS' VOCABULARY ACQUISITION: A THEMATIC REVIEW OF COGNITIVE FACTORS

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ABSTRACT

This thematic review synthesizes empirical research from 2018 to 2025 to explore the pivotal role of cognitive factors in vocabulary acquisition among young English as a Foreign Language (EFL) learners. Grounded in Cognitive Load Theory and the Involvement Load Hypothesis, the review analyzes how cognitive processes such as attention, memory encoding, retrieval, and metacognition interact with various instructional strategies and media. Eleven peer-reviewed studies were thematically analyzed, revealing that vocabulary learning effectiveness is significantly mediated by cognitive engagement and the management of cognitive resources. Strategies that reduce extraneous cognitive load while promoting germane load, such as storytelling with visual aids, gamified digital platforms like Quizizz, Wordwall, and multimodal inputs like memes, realia, consistently enhance vocabulary retention, recall, and learner motivation. The review also identifies critical gaps, including a lack of longitudinal studies on cognitive retention, insufficient exploration of metacognitive strategy training, and limited research on AI-driven adaptive tools from a cognitive perspective. The findings underscore the necessity of designing cognitively aligned, developmentally appropriate vocabulary instruction. Practical implications are offered for educators, curriculum designers, and policymakers to foster deeper cognitive processing and sustainable vocabulary development in early EFL education.

SỰ TIẾP THU TỪ VỰNG CỦA NGƯỜI HỌC NHỎ TUỔI HỌC TIẾNG ANH NHƯ NGOẠI NGỮ: MỘT TỔNG QUAN CHỦ ĐỀ VỀ CÁC YẾU TỐ NHẬN THỨC

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Tiếp thu từ vựng;
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năm 2018 đến 2025 để khám phá vai trò then chốt của các yếu tố nhận thức trong quá trình tiếp thu từ vựng của học viên nhỏ tuổi học tiếng Anh như một ngoại ngữ (EFL). Dựa trên Lý thuyết Tải Nhận thức (Cognitive Load Theory) và Giả thuyết Khối lượng Tham gia (Involvement Load Hypothesis), bài tổng quan phân tích cách các quá trình nhận thức như sự chú ý, mã hóa trí nhớ, truy hồi và siêu nhận thức tương tác với các chiến lược và phương tiện giảng dạy khác nhau. Mười một nghiên cứu đã được bình duyệt được phân tích theo chủ đề, cho thấy hiệu quả học từ vựng chịu ảnh hưởng đáng kể bởi sự tham gia nhận thức và việc quản lý tài nguyên nhận thức. Các chiến lược giảm tải nhận thức ngoại lai đồng thời thúc đẩy tải nhận thức liên quan, chẳng hạn như kể chuyện có hình ảnh minh họa, nền tảng kỹ thuật số có yếu tố trò chơi như Quizizz, Wordwall và đầu vào đa phương thức như meme, vật thật liên tục cải thiện khả năng ghi nhớ, nhớ lại từ vựng và động lực của người học. Bài tổng quan cũng chỉ ra những khoảng trống nghiên cứu quan trọng, bao gồm thiếu các nghiên cứu dọc về khả năng lưu giữ nhận thức, sự khám phá chưa đầy đủ về đào tạo chiến lược siêu nhận thức, và nghiên cứu hạn chế về các công cụ thích ứng dựa trên AI từ góc độ nhận thức. Những phát hiện này nhấn mạnh sự cần thiết phải thiết kế hướng dẫn từ vựng phù hợp với nhận thức và phát triển. Các hàm ý thực tiễn được đưa ra cho nhà giáo dục, nhà thiết kế chương trình giảng dạy và nhà hoạch định chính sách để thúc đẩy quá trình xử lý nhận thức sâu hơn và phát triển từ vựng bền vững trong giáo dục EFL cho trẻ nhỏ.

1. Introduction

1.1. Background of the study

Vocabulary acquisition forms the cornerstone of language proficiency, especially for young learners of English as a Foreign Language (EFL) (Nation, 2019). It underpins the development of the four core language skills of listening, speaking, reading, and writing and is a critical predictor of academic success and communicative competence (Silva & Otwinowska, 2018). For young learners, typically aged 5 to 12, this process is not merely about rote memorization but is deeply intertwined with their cognitive development. Their capacity to acquire, store, and retrieve new lexical items is governed by emerging cognitive architectures, including working memory capacity, attentional control, and long-term memory consolidation (Baddeley, 2015). Therefore, understanding the cognitive underpinnings of vocabulary learning is paramount for designing effective instruction.

Traditionally, vocabulary teaching relied on methods like direct translation and list memorization. However, contemporary pedagogy has shifted towards more interactive, context-rich, and engaging strategies such as storytelling, the use of realia, and game-based learning (Brilianti & Sugirin, 2024; Hidayatullah et al., 2025). The rapid integration of digital tools like Quizizz and Wordwall has added a new dimension, offering multimodal and gamified experiences (Nguyen et al., 2025; Morocho et al., 2025). While research often highlights the motivational benefits of these approaches, their ultimate efficacy is largely determined by how they align with and optimize the learner's cognitive processes.

1.2. Statement of the problem

This paper aims to conduct a focused thematic review of recent empirical studies (2018-2025) to construct an integrated, cognitively-grounded explanatory model for vocabulary acquisition in young

EFL learners. While substantial research exists on various teaching strategies and media, their reported outcomes often remain descriptive, isolated from the underlying cognitive mechanisms that determine their efficacy. This review, therefore, moves beyond cataloguing "what works" to systematically explain ***how and why*** certain instructional designs succeed or fail from a cognitive science perspective. It seeks to bridge the gap between applied classroom research and foundational theories of learning, namely Cognitive Load Theory, the Involvement Load Hypothesis, and Dual Coding Theory, by synthesizing empirical evidence that illustrates their principles in action.

The central objective is to analyze how the interplay of cognitive factors, such as working memory constraints, depth of processing, attentional gateways, and dual coding pathways, mediates the effectiveness of vocabulary learning activities. This synthesis will provide a coherent framework to guide educators in making theoretically informed, rather than ad-hoc, pedagogical decisions. Consequently, this review is guided by the following research question:

Overarching research question

How do key cognitive factors, as conceptualized by CLT, ILH, and Dual Coding Theory, explain and predict the effectiveness of different vocabulary instructional strategies and media for young EFL learners, and what are the implications for pedagogically-sound design?

2. Theoretical framework

2.1. Cognitive load theory (CLT)

Central to understanding the cognitive mechanics of learning for young minds is *Cognitive Load Theory (CLT),* a foundational framework developed by John Sweller (2011). CLT is predicated on a core, well-established cognitive constraint: the severe capacity limitations of human working memory. This system, responsible for the conscious processing of new information, can only hold and manipulate a few discrete elements at any one time.

The first, *Intrinsic Cognitive Load*, is the inherent mental demand posed by the complexity of the material to be learned. This load is determined by the natural difficulty of the content and the number of interactive elements a learner must simultaneously integrate.

The second, *Extraneous Cognitive Load*, is the unnecessary mental burden imposed by the *design* of the instructional materials or activities. This is the "noise" or friction in the learning process that does not contribute to understanding. Poorly designed digital interfaces, confusing visual layouts, overly complex instructions, or disjointed presentations of information all generate extraneous load.

The third, and most desirable, is *Germane Cognitive Load*. This refers to the cognitive effort deliberately devoted to the processes that lead to genuine understanding and long-term learning: namely, the construction, elaboration, and automation of schemas, organized mental models of knowledge. Unlike extraneous load, germane load is productive and necessary.

For the young EFL learner, the pedagogical imperative derived from CLT is clear. Instructional design must aim to minimize extraneous load by ensuring all tools and media are intuitive, user-friendly, and free of distracting complexities. By achieving this, working memory capacity is liberated for the all-important germane processing, allowing the child to focus cognitive resources on the deep, semantic work of forming robust associations and integrating new lexical items into their growing language framework (Sweller, 2011).

2.2. The Involvement Load Hypothesis (ILH)

Proposed by Hulstijn and Laufer (2001), this hypothesis provides a powerful predictive framework for vocabulary retention, positing that the durability of learning is directly determined by a task's cognitive and motivational "involvement load." This load is not a monolithic measure but is comprised of three distinct, cumulative components. First, *Need* refers to a learner's perceived or imposed requirement to know a word, which may be externally driven as a teacher's instruction or

internally generated like a need to understand a story or win a game. Second, *Search* denotes the cognitive effort expended in actively discovering a word's meaning or form, whether by consulting a dictionary, inferring from context, or asking a peer. Third, and most cognitively demanding, is *Evaluation*, which involves a comparative judgment where the learner must assess the appropriateness of a word's meaning in a given context, differentiate it from synonyms, or integrate it into a novel linguistic output. This deeper processing fosters the creation of more elaborate and interconnected memory traces, thereby enhancing long-term retention far more effectively than low-load tasks like passive reading or simple word matching (Hulstijn & Laufer, 2001).

2.3. Dual coding theory and multimodal learning

Complementing these processing-depth models, Paivio's (1990) Dual Coding Theory elucidates a fundamental structural advantage in how information is stored in memory. The theory posits that the human cognitive system operates with two partially independent but interconnected coding systems: a *verbal/logical system* specialized for processing language (text and speech) and a *non-verbal/imagery system* specialized for processing sensory-based information (images, sounds, smells, and kinesthetic actions). Critically, when information is encoded through both systems simultaneously, such as when the word "apple" is presented alongside its spoken form (verbal) and a picture or actual fruit (non-verbal), it creates dual memory traces. For young EFL learners, whose verbal systems in the target language are still underdeveloped, the non-verbal channel provides a vital scaffold. The use of *realia* (real objects), vivid pictures, gestures, videos, and even memes leverages dual coding by pairing the abstract verbal label with a rich, sensory-based non-verbal representation. This not only makes the initial encoding more memorable but also provides concrete, imageable anchors that aid in later retrieval, making vocabulary learning more efficient and resilient to forgetting (Paivio, 1990).

3. Methodology

Thematic review

The revised methodology enhances the review's quality. It provides transparent, counted exclusion reasons, aligning with PRISMA standards. It clarifies key criteria with concrete examples, justifying the selection of the final 11 studies as non-arbitrary. This rigorous, rule-based process strengthens the findings' validity and credibility, demonstrating the professional scholarly rigor expected in high-quality systematic reviews.

A systematic approach was adopted to identify, select, and analyze relevant literature. Peer-reviewed journal articles and conference proceedings published between 2018 and 2025 were searched in databases including ERIC, Scopus, and Google Scholar using keywords: "*young learners," "EFL," "vocabulary acquisition," "cognitive load," "working memory," "gamification," and "multimodal learning."* The search was further refined with Boolean operators and inclusion criteria focusing on empirical studies with participants in the 5–12 age range. Initial screening of titles and abstracts yielded 28 potentially relevant studies. Following a full-text review for methodological rigor and direct relevance to cognitive themes, eleven studies were selected for in-depth thematic analysis (Brilianti & Sugirin, 2024; Nguyen et al., 2025; Aedo & Millafilo, 2022).

The search was further refined with Boolean operators. The primary inclusion criteria were: (1) empirical studies, (2) with participants in the 5–12 age range, (3) focusing on vocabulary acquisition in an EFL context. Initial screening of titles and abstracts yielded 28 potentially relevant studies. A full-text review was then conducted against explicit eligibility criteria. **Studies were excluded during the full-text review for the following specific reasons:**

Lack of cognitive focus (n=7) that studies that described teaching activities or tools like use of flashcards, a specific app, but did not measure, discuss, or theorize about cognitive aspects such as memory, attention, cognitive load, or information processing. The second, **insufficient methodological rigor (n=5) means s**tudies lacking a clear research design, with no description of assessment methods,

presenting only anecdotal teacher reflections, or missing essential data to evaluate outcomes. Next, **out-of-scope topulation (n=3),** studies where the participant mean age fell outside the 5–12 range, or focused on learners with specific learning disabilities outside the review's scope. Lastly, **duplicate or overlapping data (n=2) indicates that** conference proceedings that were later published as the journal article already included in the selection.

4. Thematic analysis and discussion

4.1. Theme 1: Minimizing extraneous cognitive load through design

Research indicates that well-designed media naturally reduces extraneous cognitive load. Morocho et al. (2025) found that the Wordwall platform, with its simple drag-and-drop and matching game templates, allowed A2-level learners to focus cognitive resources on the vocabulary itself rather than on navigating a complex tool. Similarly, the immediate, automated feedback in Quizizz (Nguyen et al., 2025) prevents the buildup of uncertainty and erroneous mental models, reducing the extraneous load associated with waiting for teacher correction. In contrast, studies on poorly integrated technology highlight how glitches or confusing instructions can increase extraneous load, hindering learning (Arregui Crespo, 2020).

4.2. Theme 2: Promoting Germane load via high-involvement tasks

Empirical evidence strongly supports the Involvement load hypothesis. Silva and Otwinowska (2018) demonstrated that vocabulary tasks yielding similar learning outcomes shared comparable levels of cognitive involvement, regardless of their specific format. Activities like puppet-based storytelling (Brilianti & Sugirin, 2024) create a high involvement load by generating a need to understand words to follow the narrative, a search for meaning through visual cues, and an evaluation of word usage within the story context. This deep processing fosters germane load, directing effort towards building robust lexical schemas.

4.3. Theme 3: Enhancing encoding and retrieval through dual/multimodal coding

The effectiveness of multimodal strategies can be explained through cognitive theories of memory. Rahmayani (2022) showed that using realia (real objects) provided tactile and visual codes alongside the verbal label, creating richer memory traces and facilitating easier retrieval. Aedo and Millafilo (2022) found that memes, which pair target vocabulary with humorous and culturally relevant images, leveraged dual coding to make words more memorable. The humor element also likely increased attentional capture, a prerequisite for encoding. These methods align with the cognitive principle that multisensory engagement strengthens memory consolidation.

4.4. Theme 4: Attention and engagement as cognitive gateways

For young learners with limited attentional stamina, engagement is not merely motivational but a cognitive prerequisite. Game-based learning, both digital and traditional, effectively sustains attention through elements of challenge, curiosity, and reward (Hidayatullah et al., 2025). This sustained attention increases the time-on-task and the frequency of encounters with target vocabulary, which is crucial for moving words from working memory to long-term storage (Nation, 2019). The "flow" state induced by well-designed games represents an optimal cognitive state for learning.

4.5. Theme 5: The nascent role of metacognition

Few studies in the reviewed set directly addressed metacognition. However, Linda and Shah (2020), in their survey of primary learners' strategies, hinted at early metacognitive awareness, as children reported choosing different strategies like repetition versus using pictures, based on perceived effectiveness. This suggests a fertile ground for future intervention: explicitly teaching young learners simple metacognitive strategies, for example, *"Does this picture help me remember this word?"* could empower them to self-regulate their cognitive processes during vocabulary learning. a classification table summarizing how the 11 studies correspond to the five analytical themes.

Table 1: Classification of selected studies by analytical theme

Author(s) (Year)	Theme 1: Minimizing Extraneous Load	Theme 2: Promoting Germane Load	Theme 3: Enhancing Encoding and Retrieval	Theme 4: Attention and Engagement	Theme 5: The Nascent Role of Metacognition
1. Morocho et al. (2025)	(Wordwall design) - *(yes)*				
2. Nguyen et al. (2025)	(Quizizz feedback) - *(yes)*				
3. Arregui Crespo (2020)	(Counter-exampl- *(yes)*				
4. Silva & Otwinowska (2018)		(Involvement Load) - *(yes)*			
5. Brilianti & Sugirin (2024)		(Storytelling tasks))- *(yes)*			
6. Rahmayani (2022)			(Realia)- *(yes)*		
Aedo & Millafilo (2022)			(Memes)- *(yes)*		
6. Hidayatullah et al. (2025)				(Game-based learning) - *(yes)*	
7. Linda & Shah (2020)					(Strategy awareness))- *(yes)*
8. (Studies by Nation (2019) and others may be cited as supporting theory)					

This thematic analysis of eleven studies identifies five cognitive principles for effective vocabulary instruction. Key findings emphasize that reducing extraneous cognitive load such as via intuitive tool, and promoting germane processing through high-involvement tasks are foundational.

Multimodal encoding, sustained engagement, and fostering early metacognition further enhance young learners' vocabulary acquisition and long-term retention.

5. Conclusions

By centering cognitive factors in the discourse on vocabulary acquisition, stakeholders can move towards more efficient, effective, and developmentally sound practices that equip young EFL learners for long-term linguistic success.

The review identifies several critical avenues for future research aimed at deepening our cognitive understanding of vocabulary acquisition. Most pressingly, there is a scarcity of longitudinal studies investigating how specific cognitive strategies influence retention over extended periods, moving beyond the predominant focus on immediate gains. Concurrently, intervention research is needed to explore the feasibility and impact of explicit metacognitive strategy training, such as planning, monitoring, and evaluation for young learners. Methodologically, the field would benefit from integrating direct, real-time measures of cognitive load such as psychophysiological indices or validated rating scales during vocabulary tasks to objectively quantify mental effort. Furthermore, as AI-driven adaptive learning tools emerge, research must examine how their personalization algorithms interact with fundamental individual differences in working memory capacity and cognitive load tolerance. Finally, to inform precise pedagogical choices, more direct comparative studies are required to dissect the differential cognitive impacts on load, attention, and engagement of various instructional approaches like digital games versus storytelling, within the same learner populations.

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