



Enhancing Cognitive and Metacognitive Skills in Primary EFL Learners: The Pedagogical Impact of Flashcards in Algerian Classrooms

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Received: 09/08/2025

Accepted: 17/09/2025

Abstract:

This study investigates the use of flashcards as a pedagogical tool to enhance cognitive skills in fourth-grade students learning English as a foreign language. The research analyzes the effectiveness of flashcards in supporting memorization, information retrieval, and deeper cognitive engagement. Employing a mixed-methods approach, the research utilizes quantitative data from pre- and post-tests on vocabulary acquisition and qualitative data from observations and student interviews. The study concludes that flashcards are a valuable pedagogical tool for enhancing cognitive skills. The findings suggest that incorporating flashcards into teaching practices can significantly improve language learning outcomes and create a more engaging and interactive classroom environment.

Keywords: *Flashcards; Cognitive development; Metacognitive strategies; Learner motivation*

I. INTRODUCTION

Children are naturally drawn to engaging and playful tools that capture their interest and sustain their motivation. This characteristic aligns with the educational use of recreational methods to simplify learning and make it more accessible. This research emphasizes the use of flashcards within a pedagogical framework rooted in cognitive activity theories, highlighting their potential to address common challenges in classroom settings.

Teachers often face obstacles that hinder both teaching efficacy and student performance, such as a lack of motivation, high stress levels, limited innovation and creativity, social pressures, fatigue, and reluctance among students to use English beyond school contexts. The diversity of learners, as outlined in Burns' Seven Postulates (R.W. Burns, 1972), further complicates the teaching process, making it difficult to implement effective, universally engaging strategies.

Many students struggle with key aspects of learning, including memory retention, comprehension, and the practical application of knowledge. To address these difficulties, educators have sought innovative approaches that can stimulate motivation and foster creativity in the classroom. Inspired by Sebastian Leitner's method from *So lernt man lernen*, this study explores the strategic use of flashcards to improve memorization and facilitate practical language use.

Our research topic was inspired by firsthand experiences with students facing difficulties in learning, retaining, and recalling information. We set out to investigate whether flashcards could be an effective pedagogical tool to improve language learning outcomes and support teachers. Specifically, our study aims to:

- Develop learners' cognitive skills,
- Ensure a high standard of learning,
- Motivate students to learn with ease,
- Identify and bridge learning gaps,
- Make the learning process enjoyable,
- Foster stronger interaction between teachers and students,
- Improve student academic performance and reduce the risk of failure,
- Promote a collaborative learning culture,
- Encourage parental involvement in education,
- Support effective and sustainable learning practices.

Our research focuses on the cognitive benefits of using flashcards in primary education. We were particularly motivated by a study conducted at the University of Quebec in Montreal (April 2016) by Sylvain Lacasse, which examined the impact of flashcards on learning collocations among adult learners of English as a second language.

The central research question guiding this study is: "Can flashcards effectively aid in the memorization and application of information?" Our general hypothesis is that flashcards can serve as a powerful tool to enhance content retention. To explore this, we have formulated specific hypotheses:

- Flashcards can enrich learners' intellectual and creative competence.
- Flashcards can enhance learning environments through metacognitive activities.
- The use of flashcards can engage learners' memory, comprehension, and application abilities.

To test these hypotheses, we adopted an analytical approach, utilizing data from two primary sources: a questionnaire distributed to English teachers in primary schools across Cheria, Tébessa Province, and an experimental course conducted at Échahid Abdelhai Mohammed Ali Primary school, Cheria, Tébessa. The study aims to analyze and interpret these findings to validate or refute our initial assumptions.

1. Literature Review

Cognitive scientists, such as John Robert Anderson, have long likened the human brain to a natural software system that processes and decodes information efficiently. Cognitivism emphasizes both deep and surface processing, highlighting the importance of how individuals interpret and organize data to analyze, store, and retrieve knowledge (Anderson, 2000). Much like a computer, the human brain processes information naturally, which is fundamental to understanding cognitive learning theories, especially when acquiring and using a non-native language (Lightbown & Spada, 2006). In the context of tourism, effective vocabulary acquisition is crucial, as the industry relies heavily on specialized language to facilitate communication across diverse cultural and professional settings (Laosrirattanachai & Ruangjaroon, 2021).

Cognitive learning theory focuses on essential mental mechanisms, including memory, awareness, language, and perception. These mechanisms contribute to how internal thought processes become externalized as knowledge and actions. Language acquisition, therefore, occurs through a combination of conscious and subconscious mental processes. From an early age, children adapt and integrate knowledge through their interactions with their environment. However, as memory retention can decline over time, implementing effective cognitive strategies becomes crucial to strengthen long-term recall and comprehension. Techniques that emphasize the use of semantic and procedural memory are pivotal for understanding and engaging with the world (Baddeley, 1997). In tourism, these strategies are particularly important for mastering the dynamic and context-specific vocabulary required for professional communication (Lestari et al., 2023.)

Successful learning is closely linked to strategies that improve memory retention and recall. While each learner has unique preferences for how they retain information, personalized and adaptive learning approaches help empower students. These strategies foster autonomy and encourage students to identify effective tools for independent learning, ultimately enhancing their cognitive abilities across different types of memory systems. Written communication in tourism, for example, demands not only mastery of specialized vocabulary but also the ability to adapt language use to various socio-cultural and professional contexts (Universitat de València, 2024.)

John Robert Anderson's research explores various strategies and frameworks that simplify the teaching and learning process. Key theories, such as John Sweller's Cognitive Load Theory and the Expertise Theory, provide insights into how learners can progress from novices to experts through structured, experience-based education (Sweller, 1988; Ericsson et al., 2006). Cognitive strategies are foundational to education, emphasizing the importance of encoding, processing, and actively interacting with learning materials. Techniques like repetition (e.g., Sebastian Leitner's method), classification, note-taking, resource use, and inference facilitate mastery by engaging students in active intellectual tasks (Leitner, 1972).

1.1. Cognition and Metacognition

Understanding how learners acquire, process, and apply knowledge is essential for developing effective teaching strategies. Cognition and metacognition are two interconnected concepts that are crucial in this context. Cognition refers to the mental processes involved in understanding and remembering information, while metacognition is the awareness and control of these cognitive processes (Anderson, 2000; Flavell, 1979). Together, they form a comprehensive framework for learning: cognition enables the processing of information, and metacognition allows for monitoring and refining these processes.

The relationship between cognition and metacognition is highly relevant to this study, which explores how flashcards can be used to enhance learning outcomes for young EFL students. Flashcards engage cognitive processes through active recall and repetition, which are vital for memory retention (Baddeley, 1997). At the same time, they encourage metacognitive reflection, as learners assess their understanding and adjust their strategies for improved learning efficiency. By incorporating both cognitive and metacognitive strategies, this research seeks to provide a holistic approach to teaching and learning that supports deeper engagement and knowledge retention among primary school students (Lightbown & Spada, 2006; Sweller, 1988).

Cognition encompasses the mental processes involved in acquiring and understanding knowledge, while metacognition refers to the awareness and regulation of these cognitive activities. Metacognitive strategies enable learners to monitor, evaluate, and optimize their thought processes, ensuring that cognitive functions such as attention, comprehension, and planning are used effectively (Flavell, 1979). Learners without well-developed metacognitive skills often struggle to enhance their performance, underscoring the crucial role of metacognition in achieving academic success.

Metacognition involves understanding and managing one's cognitive actions. It can be broken down into four types of knowledge:

- Knowledge about tasks,
- Knowledge of strategies,
- Awareness of human thinking processes,
- Understanding of interactional dynamics.

Learners continuously seek out effective educational resources to maintain engagement and ensure high-quality learning outcomes. Methods that increase learner responsibility and participation not only boost cognitive skills but also prepare students to contribute meaningfully to society. Various pedagogical tools are available to support these objectives; however, our study focuses on a resource that remains underutilized in Algerian schools: flashcards.

1.2. Flashcards as a Cognitive Tool

The term "flashcards" refers to simple memory aids designed to facilitate information review and retention. In the 1970s, German journalist Sebastian Leitner developed flashcards based on Hermann Ebbinghaus's memory retention theories (Leitner, 1972). Flashcards typically feature a word, concept, or term illustration on one side, with the corresponding definition or explanation on the reverse. While flashcards have diverse applications across fields such as medicine, physics, and mathematics, they are particularly valuable in language education. As a pedagogical resource, flashcards promote effective memorization and the practical use of new language concepts, engaging students' cognitive and metacognitive faculties. In tourism education specifically, flashcards can help learners master the specialized and ever-evolving vocabulary needed for effective communication in real-world professional scenarios (Laosrirattanachai & Ruangjaroon, 2021; Lestari et al., 2023).

1.2.1. Variations and Applications of Flashcards

Flashcards are available in various types and configurations, categorized according to the nature of the information presented on each side. Typically, the content on the back of a flashcard complements or provides the answer to the information displayed on the front. This section highlights the utility and effectiveness of flashcards in educational settings, focusing particularly on their impact on students' cognitive processes and learning outcomes.

The subsequent parts of this study outline the research methodology, which includes a survey conducted among primary school teachers and an experimental lesson designed for fourth-grade students. The aim is to analyze the results from both approaches to evaluate the pedagogical value of flashcards, particularly in enhancing cognitive skills. The chapter concludes with a synthesis of findings from the survey and the experimental lesson.

II. Methods:

This section focuses on the specific methods employed in the research study. It outlines the tools and procedures used to collect and analyze data, ensuring a clear understanding of how the research was conducted.

1. Data Collection

The study utilizes two primary methods for data collection:

- a. **Questionnaire:** A structured questionnaire was distributed to 30 primary school teachers to gather information about their experiences with flashcards as a pedagogical tool. The

questionnaire consisted of four sections, each focusing on specific aspects of flashcard usage and effectiveness.

- b. **Experimental Lesson:** An experimental lesson was designed and implemented with fourth-grade students to observe the impact of flashcards on their learning outcomes. The lesson involved using flashcards to introduce new vocabulary and assess students' comprehension and retention.

2. Data Analysis

3. Methodology

This study adopted a mixed-methods approach, combining quantitative and qualitative elements to comprehensively assess the impact of flashcards in the EFL classroom. The research sample consisted of 30 primary school teachers from Cheria, Tébessa Province, selected to represent a variety of academic backgrounds and teaching experiences. This diversity in the participant pool ensured a broad range of insights regarding the pedagogical application of flashcards.

The data collection process involved administering the structured questionnaire, which comprised four sections. The first section focused on gathering demographic information about the teachers, including their academic qualifications and teaching experiences, while also identifying instructional challenges they face. The second section delved into the variety of teaching practices employed by the educators, providing context for how flashcards fit into their broader instructional strategies.

The third section addressed the core focus of the research, investigating the effectiveness of flashcards in improving learning outcomes. This section featured three targeted questions that measured teachers' perceptions of flashcards' efficiency, as well as an open-ended question allowing for qualitative feedback on the advantages and limitations of using flashcards as a learning tool.

The final section aimed to gather additional insights related to the teachers' experiences and the perceived impact of flashcards on students' memorization and overall learning. By employing this methodology, the study sought to provide a nuanced understanding of the role of flashcards in EFL education, highlighting their potential benefits and challenges as a pedagogical resource. Data analysis was conducted using both statistical methods for quantitative responses and thematic analysis for qualitative feedback, ensuring a comprehensive interpretation of the findings.

III. Results and Discussion :

1. Results

The results of the study provided valuable insights into how primary school teachers in Cheria, Tébessa Province use flashcards to teach English as a Foreign Language (EFL) and their perceptions of the tool's effectiveness in enhancing learning outcomes.

1.1 Teachers' Use of Flashcards

The data revealed that flashcards are a widely adopted teaching tool among the participating educators, with 75% of teachers using them regularly in their EFL classes. The remaining 25% reported using flashcards selectively, often depending on the complexity of the topic or the learning objectives of specific lessons. The responses highlighted that teachers frequently use flashcards to introduce new vocabulary, reinforce language structures, and support active recall during review sessions.

1.2 Perceived Effectiveness of Flashcards

The majority of teachers (80%) expressed strong confidence in the effectiveness of flashcards in improving students' memorization and retention of new vocabulary. They emphasized that the visual and interactive nature of flashcards helps engage young learners and facilitates better recall through repetition. Teachers also noted that using flashcards in combination with games or group activities fosters a more dynamic and enjoyable learning environment.

However, 20% of participants indicated mixed results, pointing out that while flashcards can be effective, their impact varies depending on students' individual learning styles and attention spans. Some teachers mentioned that students with shorter attention spans or those who are more kinesthetic learners may require additional or alternative teaching methods to stay engaged.

1.3 Addressing Cognitive Challenges

Teachers provided qualitative feedback on the cognitive challenges young learners face when acquiring a new language. Many noted that flashcards are particularly helpful in overcoming difficulties associated with memorization and recall, as they promote active engagement and spaced repetition. The open-ended responses also suggested that the simplicity and clarity of flashcards aid in reducing cognitive overload, making new concepts more digestible for young learners.

Despite these advantages, a few teachers highlighted limitations, such as the inability of flashcards to fully address more complex cognitive processes, like comprehension and critical thinking. Some educators suggested that while flashcards are beneficial for vocabulary acquisition, they should be supplemented with other teaching strategies to support deeper language understanding.

2. Discussions

3. Limitations and Future Studies

Despite the valuable insights gained from this research on the use of flashcards in teaching English as a Foreign Language (EFL), several limitations must be acknowledged. First, the relatively small sample size of 30 primary school teachers, limited to Cheria, Tébessa Province, may not fully represent the broader population of EFL educators. This geographical and sample constraint reduces the generalizability of the findings and suggests the need for further studies with larger and more diverse samples.

Second, the study relied solely on self-reported data collected through structured questionnaires. While this method provided comprehensive perspectives on teachers' experiences and attitudes, self-reported data can be subject to bias, such as social desirability or recall inaccuracies. Future research could benefit from employing a mixed-methods design that incorporates classroom observations and interviews to complement and validate the questionnaire findings.

Additionally, this study focused specifically on the teachers' perspectives and did not directly measure students' learning outcomes. Future studies could include longitudinal research that tracks students' performance and retention rates when flashcards are used, providing empirical evidence of the tools' impact on learning. Moreover, investigating how factors like students' age, proficiency level, or learning style influence the effectiveness of flashcards would deepen our understanding of their pedagogical value.

Lastly, while this study explored the general use of flashcards and their perceived effectiveness, it did not examine how different design features of flashcards (e.g., the use of visuals, color coding, or interactivity) may affect learning. Future research could explore these design elements to identify the most effective flashcard characteristics for enhancing EFL education.

IV. Conclusion

This study has successfully validated our initial hypothesis and objectives. Hence, the findings affirm that Sébastien Leintner's method is not only effective but also simple to implement and reusable. Flashcards emerge as invaluable pedagogical tools for English teachers and educators across various disciplines. By incorporating flashcards into their teaching strategies, educators can create high-quality, structured learning experiences that enhance student motivation—an essential element of effective learning.

Additionally, flashcards promote knowledge retention by engaging crucial cognitive processes, including attention, perception, memory, and reflection. They prove to be a powerful

technique for helping learners effectively memorize new concepts while simultaneously enriching their cognitive and metacognitive skills. By bolstering long-term memory, flashcards can be applied across subjects, serving as useful tools for task completion, knowledge recall, and effective home study in preparation for exams.

Despite their proven effectiveness, flashcards remain underutilized in educational settings. This underscores the need to raise awareness of their potential benefits and to encourage their integration into everyday teaching practices.

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