Enhancing ESL learners' productive vocabulary through multimedia solutions

By Hala M. Bastawros, Canada

Abstract

This qualitative embedded case study aims to examine how applying multimedia theories in online courses can enhance vocabulary acquisition, retention, and production among adult English as a Second Language (ESL) learners at a non-profit organization in Ontario, Canada. Guided by Mayer's Cognitive Theory of Multimedia Learning (CTML), the study probes how ESL learners can transfer, retain, and produce new vocabulary more effectively. Data collection involves criterion sampling and analysis through MaxQDA, encompassing physical artifacts, personal interviews, and online questionnaires. The findings underscore integrating multimedia elements' efficacy in facilitating new vocabulary retention and production. The study underscores the pivotal link between vocabulary acquisition, communication skills, and the integration of multimedia principles in online education. Moreover, the research emphasizes the need to consider the interplay between technology, pedagogy, and learner characteristics in designing online educational interventions for adult ESL learners. Overall, the findings contribute valuable insights to language education, advocating for the integration of evidence-based multimedia principles to empower adult ESL learners in achieving their language learning goals and effective communication in diverse contexts.

Keywords: *retention, production, vocabulary, adult ESL learners, multimedia learning, course design, technology*

Introduction

This study aims to address the gap in adult learners' productive vocabulary learning in ESL by exploring effective multimedia methods (Coady, 1997; Coady & Huckin, 1997; Davis, 1989; Gass, 1987; Read, 2004; Zimmerman, 1997). While vocabulary acquisition has been extensively studied, transitioning receptive vocabulary skills to productive skills in L2 learners, particularly adults seeking employment opportunities in North America, requires further research (Heidari, 2019; Wang et al., 2022). The shift to online learning due to the pandemic has exacerbated challenges for ESL learners, including language barriers and adapting to digital tools (Heidari, 2019). Without adequate support, ESL learners may lose motivation and become isolated, leading to missed opportunities for both the learners and their communities, as well as potential linguistic prejudice.

Problem statement

The problem is the poor application of multimedia design principles in course design for L2 learners, leading to cognitive overload, distraction, and poor learning outcomes (Noetel et al., 2022). Such practice has resulted in significant implications, including high learner dropout rates, delayed progress, difficulties in finding employment (Wang et al., 2022), and low self-esteem. Additionally, there is insufficient research in several areas, such as receptive and productive vocabulary retention and production for adult ESL learners (Heidari, 2019), the impact of learning context on L2 vocabulary acquisition and listening development (Yu et al., 2021), and the effects of semantic elaboration on L2 learners' performance (Rice & Tokowicz, 2020), which has affected vocabulary retention and production studies.

When ESL learners migrate as newcomers and refugees, many lack adequate English proficiency in their new country, limiting their ability to find professional jobs, connect with the community, and network effectively, potentially leading to poverty, depression, isolation, and other personal and social problems (Wang et al., 2022). Those outcomes highlight a clear gap in the literature regarding vocabulary retention and production for these ESL learners.

Purpose statement

The purpose of this qualitative embedded case study is to identify the multimedia principles that enhance productive vocabulary skills' transfer, retention, and production in online ESL classes for adult learners. This study takes place in Ontario, Canada, at a non-profit organization pseudonymously called ABC.

Research questions

This qualitative embedded case study focuses on probing how applying multimedia-specific tools and principles can improve productive vocabulary retention and production for ESL learners. Additionally, it ascertains learners' perception of the best methods that help them acquire and retain information effectively in their online courses.

Central research question

How can ESL learners transfer, retain, and produce newly learned vocabulary effectively in online courses?

Sub-question one

What is the influence of Mayer's 12 multimedia principles in online course design on ESL learners' ability to retain and produce vocabulary?

Sub-question two

What are learners' perceptions of the effective multimedia elements that have enabled them to retain and utilize their productive vocabulary effectively in their online courses?

Theoretical framework

This embedded single case study is anchored on Mayer's Cognitive Theory of Multimedia Learning (CTML). It offers a proposal to improve learning in online platforms that should have a positive impact on L2 learners' knowledge retention (Michelle, 2017). Michelle (2017) explained that, according to CTML, learners can transfer knowledge better when presented with multimodal instruction rather than in one format. The purpose is to allow learners to build connections between verbal and visual representations at the same time. CTML accounts for how our memory works and bases its framework on three concepts: (1) limited capacity, (2) dual channels, and (3) active processing.

In the realm of digital media learning, Schneider et al. (2022) explained that CTML offers a framework model of the entire learning process and relies on three key assumptions: (1) Information is processed through two cognitive channels, as established by Paivio and Baddeley; (2) the capacity of the working memory system is limited, as posited by Baddeley's working memory model (Laufer, 1992); and (3) learners must actively process information to construct coherent mental representations and models, according to the constructivist theory.

Related literature

There are two main key principles that the CTML is built on. The first one is Sweller's Cognitive Load Theory (CLT) (Sweller, 2010), which explains the proper design of presentation modes and media delivery. The second one is Paivio's Dual Coding Theory (DCT) (Paivio, 2013), which contributes to the understanding of sensory modalities (Şendurur et al., 2020).

Mayer's 12 Principles of Multimedia Learning

Mayer (2014) outlines 12 principles of multimedia learning that guide the effective design of instructional materials:

1. Coherence Principle: People learn better when extraneous words, pictures, and sounds are excluded rather than included. This principle helps reduce cognitive overload and focuses learners on essential content.

2. Signaling Principle: People learn better when cues that highlight essential material are added. This principle emphasizes the importance of guiding learners' attention to critical information.

3. Redundancy Principle: People learn better from graphics and narration than from graphics, narration, and on-screen text. This principle suggests that too much information can overwhelm learners.

4. Spatial Contiguity Principle: People learn better when corresponding words and pictures are presented near rather than far from each other on the page or screen. This principle facilitates the integration of verbal and visual information.

5. Temporal Contiguity Principle: People learn better when corresponding words and pictures are presented simultaneously rather than consecutively. This principle enhances the connection between related information.

6. Segmenting Principle: People learn better from a multimedia lesson when it is presented in smaller segments rather than as a continuous unit. This approach allows for better processing of information.

7. Pre-training Principle: People learn better from a multimedia lesson when they know the names and characteristics of the main concepts prior to the lesson. This prior knowledge prepares learners to understand new content.

8. Modality Principle: People learn better from graphics and narrations than from animation and on-screen text. This principle supports the use of multiple forms of media to enhance learning.

9. Multimedia Principle: People learn better from words and pictures than from words alone. This principle emphasizes the effectiveness of combining verbal and visual elements.

10. Personalization Principle: People learn better from multimedia lessons when words are used in a conversational style rather than a formal style. This principle enhances relatability and engagement.

11. Voice Principle: People learn better when the narration in multimedia lessons is spoken in a friendly human voice rather than a machine voice. A human voice adds warmth and encourages engagement.

12. Image Principle: People do not necessarily learn better from a multimedia lesson when the speaker's image is added to the screen. This principle suggests that the presence of a speaker may not always enhance learning outcomes.

Challenges in vocabulary learning for ESL learners

Despite the potential benefits of multimedia, ESL learners face various challenges in acquiring productive vocabulary. Many adult learners struggle with language barriers, lack of motivation, and inadequate access to technological resources (Wang et al., 2022). These challenges can hinder their ability to engage with multimedia content effectively, leading to frustration and decreased learning outcomes. Therefore, it is essential to identify barriers and implement strategies to support learners in overcoming these challenges.

Methodology

Research design

This study employed a qualitative embedded case study design, focusing on adult ESL learners at a non-profit organization in Ontario, Canada.

Participants

The study involved a diverse group of adult ESL learners, including newcomers and refugees, who were enrolled in online language courses. Participants were selected through criterion sampling to ensure a range of experiences and backgrounds that reflect the population of adult ESL learners in Ontario.

Data collection

Data were collected using a combination of physical artifacts, personal interviews, and online questionnaires. The interviews focused on learners' perceptions of multimedia tools and their effectiveness in facilitating vocabulary learning. The questionnaires included measures of vocabulary retention and production.

Data analysis

Data analysis was conducted using MaxQDA software, enabling the identification of themes and patterns related to the integration of multimedia in vocabulary instruction. The analysis aimed to capture learners' experiences and insights regarding the use of multimedia tools, thus providing a comprehensive understanding of their impact on vocabulary learning.

Summary of thematic findings

The study revealed critical insights aligned with Mayer's principles, emphasizing how multimedia elements can optimize vocabulary retention and productive use for adult ESL learners:

1. Narration: The use of narration, when paired with relevant graphics, significantly enhances learning outcomes compared to pairing graphics with additional text. This aligns with Mayer's Modality Principle, which underscores the importance of using auditory channels alongside visual materials to reduce cognitive overload. Learners reported that narrated lessons felt more dynamic and engaging, fostering a deeper understanding of vocabulary usage.

2. Repetition: Repetition emerged as a cornerstone for reinforcing vocabulary knowledge. Effective repetition involves presenting words in varied contexts—through activities like flashcards, sentence creation, and interactive quizzes. This strategy adheres to the Multimedia Principle, engaging both visual and verbal cognitive channels to ensure long-term retention. Participants noted that revisiting vocabulary through spaced intervals helped bridge the gap between recognition and productive use.

3. Visuals: Visual aids, such as infographics, diagrams, and animations, improve performance when combined with concise textual explanations. This finding supports the Spatial Contiguity Principle, which emphasizes the importance of placing corresponding visuals and text close together to enhance comprehension. Learners shared those visual representations clarified abstract concepts, making vocabulary easier to grasp and apply in real-world scenarios.

4. Human Voice: Engaging narration, delivered in a conversational and natural tone, makes content more relatable and accessible to learners. This aligns with the Voice Principle, which highlights the

benefits of using human voices rather than robotic or synthetic tones. Participants described feeling more connected to the material when lessons were narrated with warmth and expressiveness, fostering a sense of inclusivity and encouragement.

The statistical distribution in Figure 1 reinforces the thematic findings, emphasizing the multifaceted nature of visual engagement. The integration of narration, repetition, visuals, and human voice collectively creates a robust multimodal approach, aligning with the thematic emphasis on effective multimedia elements.

	A	B	C
1		Segments	Percentage
2	TOTAL	130	100.00
3	Narration	18	13.85
4	Repetition	16	12.31
5	Visuals	14	10.77
6	Human Voice	12	9.23

Figure 1: *Top-Level Code Statistics using MAXQDA*

Overcoming common challenges in online ESL vocabulary learning

Online ESL learners often face challenges such as cognitive overload, disengagement, and difficulties adapting to digital tools. The following strategies can help educators mitigate these challenges:

- Simplify Content: Clear and concise visuals, paired with focused text or narration, are crucial for minimizing cognitive load. Lessons should avoid unnecessary elements and prioritize key vocabulary to ensure learners can concentrate on the most relevant information. Scaffolding, where complex content is broken into smaller, manageable units, further aids comprehension and retention.

- Gamify Learning: Gamification involves adding game-like elements—such as quizzes, leaderboards, or digital badges—to motivate learners and make vocabulary practice more enjoyable. Tools like Kahoot! and Quizlet Live allow learners to compete or collaborate in real time, adding an element of fun while reinforcing vocabulary knowledge. This approach enhances engagement and encourages consistent participation.

- Interactive Lessons: Utilizing video tools like Edpuzzle or PlayPosit, educators can embed questions, feedback, and prompts into video lessons. This interactivity keeps learners engaged and offers real-time reinforcement, ensuring they remain active participants in the learning process. Such tools

align with the Segmenting Principle, allowing learners to digest information in small chunks.

- Personalized Learning: AI-driven platforms, such as Duolingo or WordUp, can tailor exercises to meet individual learner needs. These tools adapt to a learner's progress, offering targeted practice based on performance. By personalizing content, educators can address diverse learning preferences and skill levels, ensuring every learner has an opportunity to succeed.

Key takeaways

To optimize vocabulary acquisition and usage in online ESL courses, educators should focus on these key strategies:

1. Leverage Multimedia Tools: Combining visuals, narration, and AI-driven personalization creates a holistic learning experience. Multimedia tools engage multiple senses, fostering deeper connections to the material and improving retention.

2. Avoid Cognitive Overload: Simplifying visuals and scaffolding content ensures learners can process information without feeling overwhelmed. Chunking lessons into smaller, digestible sections aligns with Mayer's principles and accommodates varying learner capacities.

3. Engage Through Gamification: Interactive, game-like elements make vocabulary practice enjoyable and rewarding. Platforms like Kahoot! not only encourage active participation but also provide instant feedback, helping learners track their progress.

4. Incorporate Interactive Videos: Embedding questions, quizzes, and reflective prompts into video lessons promotes active engagement. This approach enhances comprehension and enables learners to apply vocabulary in context.

Conclusion

The integration of multimedia design principles in online ESL courses is not merely a supplementary strategy, it is essential for fostering effective vocabulary acquisition and usage. Mayer's principles provide a valuable framework for designing learner-centered, engaging content that addresses the unique needs of adult ESL learners. By simplifying content, incorporating gamified activities, and leveraging interactive tools, educators can overcome common challenges and create dynamic, supportive learning environments. These strategies not only improve vocabulary retention but also empower learners to achieve their linguistic and professional goals, ultimately enhancing their confidence and success in real-world communication.

References

Coady, J. (1997). L2 vocabulary acquisition: A synthesis of the research. In J. Coady & T. Huckin (Eds.), *Second language vocabulary acquisition: A rationale for pedagogy* (pp. 273–291). Cambridge University Press.

Coady, J., & Huckin, T. (1997). *Second language vocabulary acquisition*. Cambridge University Press.

Davis, J. N. (1989). Facilitating effects of marginal glosses on foreign language reading. *Modern Language Journal, 73*(1), 41. https://doi.org/10.2307/327266

Gass, S. M. (Ed.). (1987). *The use and acquisition of the second language lexicon*. Cambridge University Press.

Heidari, K. (2019). Willingness to communicate: A predictor of pushing vocabulary knowledge from receptive to productive. *Journal of Psycholinguistic Research, 48(4),* 903–920. https://doi.org/10.1007/s10936-019-09639-w

Laufer, B. (1992). How much lexis is necessary for reading comprehension? In P. Arnaud & H. Bejoint (Eds.), Vocabulary and applied linguistics (pp. 126–132). London: Macmillan.

Mayer, R. E. (2014). *The Cambridge handbook of multimedia learning* (2nd ed.). Cambridge University Press.

Noetel, M., Griffith, S., Delaney, O., Harris, N. R., Sanders, T., Parker, P., del Pozo Cruz, B., & Lonsdale, C. (2022). Multimedia design for learning: An overview of reviews with meta-meta-analysis. *Review of Educational Research, 92*(3), 413–454. https://doi.org/10.3102/00346543211052329

Paivio, A. (2013). Dual coding theory, word abstractness, and emotion: A critical review of Kousta et al. (2011). *Journal of Experimental Psychology: General, 142*(1), 282–287. https://doi.org/10.1037/a0027004

Read, J. (2004). 7. research in teaching vocabulary. *Annual Review of Applied Linguistics, 24,* 146–161. https://doi.org/10.1017/S0267190504000078

Rice, C. A., & Tokowicz, N. (2020). A review of laboratory studies of adult second language vocabulary training. *Studies in Second Language Acquisition, 42*(2), 439–470. https://doi.org/10.1017/S0272263119000500

Rudolph, M. (2017). Cognitive Theory of Multimedia Learning. *Journal of Online Higher Education, 1*(2). https://www.studocu.com/ph/document/labas-senior-high-school/bs-math/rudolph-2017-cognitive-theory-of-multimedia-learning/62690585

Schneider, S., Beege, M., Nebel, S., Schnaubert, L., & Rey, G. D. (2022). The cognitive-affective-social theory of learning in digital environments (CASTLE). *Educational Psychology Review, 34*(1), 1–38. https://doi.org/10.1007/s10648-021-09626-5

Sweller, J. (2010). Cognitive load theory: Recent theoretical advances. In J. L. Plass, R. Moreno, & R. Brünken (Eds.), Cognitive load theory (pp. 29–47). *Cambridge University Press.* https://doi.org/10.1017/CBO9780511844744.004

Wang, C., Sainz, A., Joshi, S. C., & Alfred, M. V. (2022). A case study of adult education and literacy programs and the transition to remote services during the COVID–19 pandemic. *New Horizons in Adult Education & Human Resource Development, 34*(1), 37–50. https://doi.org/10.1002/nha3.20352

Yu, X., Janse, E., & Schoonen, R. (2021). The effect of learning context on L2 listening development: Knowledge and processing. *Studies in Second Language Acquisition, 43*(2), 329–354. https://doi.org/10.1017/S0272263120000534

Zimmerman, C. B. (1997). Historical trends in second language vocabulary instruction. In J. Coady & T. Huckin (Eds.), *Second language vocabulary acquisition: A rationale for pedagogy* (pp. 5–19). Cambridge University Press.

Author Bio

Hala M. Bastawros, PhD, is a seasoned eLearning Manager and instructional design expert with over 20 years of experience in TESL methodology and enhanced technology learning. Passionate about transforming adult ESL education, she leverages innovative, evidence-based strategies to bridge learning gaps and enhance language acquisition. Her work empowers both learners and educators to thrive in digital and multicultural environments, equipping them with the skills to navigate the evolving landscape of education and technology with confidence.