

ENHANCING PRODUCTIVE VOCABULARY OF ESL LEARNERS: A QUALITATIVE
CASE STUDY

Hala Bastawros
Liberty University

A Dissertation Presented in Partial Fulfillment
Of the Requirements for the Degree
Doctor of Philosophy

Liberty University

2024

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APPROVED BY:

Rick Bragg, Committee Chair

Janet Deck, Committee Member

Abstract

The purpose of this qualitative embedded case study is 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 effectively transfer, retain, and produce new vocabulary. Data collection involves criterion sampling and analysis through MaxQDA, encompassing physical artifacts, personal interviews, and online questionnaires. The findings underscore the efficacy of integrating multimedia elements to facilitate new vocabulary retention and production, emphasizing the importance of the application of productive skills across diverse learning styles. The study underscores the pivotal link between vocabulary acquisition, communication skills, and the integration of multimedia principles in online education. It highlights the significance of adopting multimedia principles to create dynamic learning experiences that cater to diverse learner preferences, ultimately enhancing engagement and effectiveness. 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

Copyright Page

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Dedication

In humble gratitude, I dedicate this dissertation to the divine presence of God, whose guidance and grace have illuminated my path and granted me strength throughout this journey.

To my dearest friend and brother-like figure, Joseph Ng, your unwavering support, sage advice, and encouragement sustained me through every challenge and have been a beacon of light in my darkest moments. Your friendship is a cherished gift that I hold very close to my heart.

To my beloved daughters Julie and Jouvana, your presence in my life, love, and steady belief in me have been my most significant source of motivation. You have been my constant companions, cheering me on every step of the way. You give my life profound meaning and purpose.

To all my family and friends, your endless love, understanding, and encouragement have been a source of comfort and inspiration. Your presence in my life fills it with joy and warmth, and I am deeply grateful for each of you.

Moreover, finally, to the newest addition in my life, Darren Cleary, your boundless positivity, encouragement, and constant support have uplifted me in ways I never thought possible. I am blessed to have you by my side at this time in my journey.

This dissertation is a testament to the love, support, and encouragement of each of you. Thank you for being my guiding stars and for believing in me every step of the way.

Acknowledgments

I would like to extend my gratitude to Dr. Rick Bragg, my dissertation chair, for his invaluable guidance throughout this journey. Additionally, I am deeply thankful to Dr. Bill Acton, the program manager of my MA, for his continuous support and direction. Special appreciation also goes to Dr. Gordon Moulden for generously dedicating his time and expertise to advise and steer me in the right direction whenever I needed him. Lastly, I extend my thanks to all my other professors who played a significant role in assisting and guiding me through this process.

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List of Abbreviations

Cognitive Theory of Multimedia Learning (CTML)

English as a Second Language (ESL)

Enhanced Language Training (ELT)

Second Language learner (L2)

CHAPTER ONE: INTRODUCTION

Overview

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.

Background

With the COVID-19 pandemic, online learning became one of the quickest-growing industries (Dias et al., 2020), which led to a move en masse to E-learning platforms using different Learning Management Systems (LMSs). Meanwhile, adult ESL learners suffered from that transition (Machynska & Boiko, 2020). Some adult learners thought online learning could facilitate learning during the pandemic, a phenomenon known as performance expectancy (Md Yunus et al., 2021); on the contrary, adult ESL learners face many challenges in online learning (Sailsman, 2020). The following sections closely examine the historical, social, and theoretical background of this problem.

Historical Context

When L2 learners and adult immigrants immigrate to North America, they are required to

have adequate English language proficiencies in order to live, work, and communicate with locals. Generally, they find it challenging to join the workforce or cultivate social and cultural relations outside their language or ethnic communities (Ippolito, 2021). Low language proficiency can lead them to miss prospects in higher education (Ippolito, 2021) or licenses they studied for in a regulated profession in their home countries.

Adding to the burden of mastering a second language, online learning can pose additional challenges to those learners, especially with beginner or intermediate language proficiency; they may never obtain satisfactory communicative competence in their second language (L2) (Chin Lee Lee et al., 2019). Historically, online education has only grown in the last two decades, yet the dropout rates have also been high (Park & Choi, 2009). The implications are that learners may lose work opportunities in their new countries, lose connection with their children or grandchildren, and become isolated within their communities due to a lack of language proficiency (Wang et al., 2022).

Furthermore, more than 40% of adults with low English proficiency in the United States have lower chances of finding employment, especially given our current technological era, and they live in poverty (Wang et al., 2022). Moreover, there are various factors negatively affecting L2 learners learning and progress, to name a few, lack of access to computers, lack of a widespread online infrastructure, lack of instructors' and learners' readiness, insufficient teachers' training, and learners' poor attitudes and perceptions (Md Yunus et al., 2021; Wang et al., 2022).

Social Context

When ESL learners cannot reach adequate communicative competence in their L2, they may face social challenges (Chin Lee Lee et al., 2019). First, when adult learners cannot relate to

their studies, they lose interest in their courses and drop out, which causes the institutions to lose revenue and learners to lose their spots and goals in higher education and employment. Studies show that 70% of learners enrolled in corporate online classes do not complete them (Park & Choi, 2009).

Second, adult ESL learners continue their online education concurrently with their life, family, and, most likely, work responsibilities. With all these commitments in mind, learners' characteristics and responsibilities place unique challenges for them, their families (Kara et al., 2019), and their instructors. Third, work constraints, personal or family issues, motivation to study, interaction, academic integration, most notably their locus of control, self-regulation, and metacognitive skills are additional factors influencing adult learners to drop out of their online studies (Kara et al., 2019). Consequently, when adult learners drop out of school and cannot find employment, they become unemployed and require social assistance, which can drain any country's economy, and societies may lose the expertise of those ESL learners who are mostly newcomers to the country.

Theoretical Context

Theories describing human intelligence and cognitive ability have been criticized for lacking empirical validity (Shearer, 2020). According to neuroscientists, intelligence is either based on general intelligence (G) or crystallized intelligence. The G intelligence is tested through IQ tests (Shearer, 2020). Many theorists deviated from the former rigid description of intelligence to the latter, one of which is the embattled theory of multiple intelligences (MI) that Gardner proposed in 1983 (Krahnke, 1983). MI is the first intelligence theory that was instituted on neuroscientific evidence (Shearer, 2020). Other theories include the triarchic intelligence theory by Sternberg in 1999 (Sternberg, 1999), the emotional intelligence theory by Goleman,

and the cognitive styles theory by Kolb and Kolb (Shearer, 2020).

In an attempt to understand how people acquire, transfer, retain, and produce information and knowledge, Canadian researcher, Allan Paivio, formulated his Dual Coding Theory (DCT). According to DCT, learners can attain better and longer information retention when they utilize the two interconnected pathways in their brain to encode information, e.g., the verbal and visual systems (Hartland et al., 2008).

Later, Mayer (1997) built his CTML on the findings presented from the DCT and developed CTML that aims to help online learners understand complex explanations and cause-and-effect systems. According to Mayer, when people are given verbal and visual information, a medium of over 75% of them improve on problem-solving and being creative in the tests they are given (Mayer, 1997).

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. At this stage in the research, multimedia features that enhance vocabulary retention are generally defined as multimedia tools that inform course design.

Significance of the Study

Vocabulary acquisition and communication skills are tightly intertwined; therefore, the retention, production, and application of productive skills are of critical importance to learners of all ages (Heidari, 2019). The following sections depict this study's theoretical, empirical, and practical significance.

Theoretical Significance

Driven by the lack of previous studies on improving productive vocabulary retention in adult ESL learners in online course design and the existing gap in the literature, this research highlights three implications for the body of research and literature. This study presents multimedia methods in the course design based on CTML to help learners produce and retain productive vocabulary skills effectively. Additionally, this research provides a connection between CTML and course design features for synchronous, asynchronous, and distance online instruction models. Lastly, the study also informs course designers and educators of the best

approaches, multimedia tools, and methodologies to help learners master productive vocabulary skills.

Empirical Significance

This study adds to the literature on multimedia tools and their role in improving productive vocabulary skills in course design for adult ESL learners in Canada since productive vocabulary skills for adult learners have yet to be thoroughly researched. The study also complements Heidari's (2019) study on Willingness to Communicate (WTC) and its effect on enhancing learning in general and vocabulary production in particular for adult learners. Heidari's (2019) study assumes that WTC can predict learners' receptive and productive lexical knowledge, as well as their success in shifting from receptive to productive mode.

To put Heidari's hypothesis to the test, 104 Iranian EFL students were chosen for the study and given three different instruments. Their willingness to communicate, receptive vocabulary knowledge, and productive vocabulary knowledge were all assessed using the instruments. The study found that learners with high and low WTC had comparable levels of receptive lexical knowledge. Learners with higher WTC, on the other hand, had more productive vocabulary knowledge than those with lower WTC. As a result of the findings, WTC may be able to predict the transition of learners' lexical knowledge from receptive to productive mode (Heidari, 2019).

The current study also adds to the proposal on multimedia techniques to improve motivation and engagement in adult learning (Noetel et al., 2022). It further addresses adult learners' challenges in distance learning identified in previous studies (Kara et al., 2019). This study should broaden the understanding of the application of multimedia techniques through the context of CTML to facilitate the recall and application of productive vocabulary skills.

Practical Significance

First, the study highlights that almost 60% of ESL learners take longer to progress their productive skills than their receptive skills in the same period, based on the stats from the Canadian provincial training database HARTs (Centre for Canadian Language Benchmarks, n.d.). Second, based on survey results, most non-profit organizations' course design is outdated, and this study can yield some updates to improve learners' productive language skills. Third, this study can be shared in different partnership meetings and conferences to be used as a basis for professional development projects for teachers, course designers, and material writers.

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 in a non-profit organization for adult students in Ontario, Canada. Additionally, it ascertains learners' perception of the best methods that help them acquire and retain information effectively in their online courses. Exploring multimedia tools fill a gap in the literature between vocabulary retention for ESL learners and technology application in course design for online learning.

Central Research Question

How can English as a Second Language (ESL) learners transfer, retain, and produce newly learned vocabulary effectively in online courses?

This central question is significant since it provides information on ways to improve vocabulary skills for L2 learners, which can be detrimental to their lives and careers in their new countries (Wang et al., 2022). The study combines technology application and vocabulary retention for L2 learners, a topic that is important and recommended for future studies.

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?

The first sub-question explores Mayer's 12 multimedia principles' positive impact on course design relating to users' productive vocabulary skills. There are many course design principles, but Noetel et al. (2022) mentioned 11 principles that demonstrated positive and significant effects on learning. The goal of answering this question is to understand and discover which principles effectively facilitate vocabulary recalling and production.

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?

Understanding and analyzing learners' perception of the course design elements that help them remember, produce, and maintain information and, more specifically, productive vocabulary skills is crucial for developing course material and implementing multimedia elements in the course design.

Definitions

1. *Cognitive Overload* – when the information is more than the working memory can hold at one interaction (Noetel et al., 2022)
2. *English as a Second Language (ESL)* - people who have an undergraduate or graduate degree from their former countries and move to a new country (Albert et al., 2013).
3. *Multimedia Learning* – learning new information from words and pictures using a computer (Rudolph, 2017)

4. *Performance Expectancy* –the degree to which learners perceive that using online learning helps them to learn better during the pandemic (Md Yunus et al., 2021).
5. *Productive Vocabulary Skills* –the ability to recall, retrieve, and produce a word or a lexical item in a speech or text (Heidari, 2019).
6. *Receptive Vocabulary Skills* – the ability to recognize and remember a word or lexical item the learner sees or hears (Heidari, 2019).

Summary

Online learning has become an inevitable reality in today's education system, especially after a significant pandemic. One of the most vulnerable groups is newcomers and refugees, including many ESL learners, who face many challenges and barriers to pursuing or continuing further education in their new country of residence. The language barrier and a lack of effective communication in their L2 have been the top concerns that ESL learners have reported. Accordingly, building a vast repertoire of productive vocabulary would substantially facilitate their communication. This study presents the best empirical multimedia principles and elements to enable L2 learners to transfer, retain, and produce more productive vocabulary in their online courses.

This chapter briefly reviews the historical, social, and practical background of the problem, the purpose of the study, and the research questions. Chapter One provides an embedded case study to fill the gap in current research literature concerning multimedia principles that could improve productive vocabulary retention for adult ESL learners. This study consists of five chapters, starting with a literature review and proceeding to methods, findings, and conclusion.

CHAPTER TWO: LITERATURE REVIEW

Overview

This embedded case study focuses on the best ways to improve ESL learners' communicative skills by investigating the multimedia tools and principles that will help L2 learners apply, remember, and utilize their productive vocabulary knowledge and elicit their perception of the best elements in online course design, all of which could help enhance their productive communicative and language skills. The proposed study highlights the significance of incorporating learning theories; therefore, the conceptual framework below comprises of multiple theories and research findings that have been categorized into three constructs: laying out the conceptual framework of the theory that informs my study, providing and synthesizing related literature for this study, and lastly, identifying gaps in the literature related to the study. Finally, I conclude Chapter 2 with a summary of its content and justify why this dissertation may help fill those gaps.

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 (Rudolph, 2017). Rudolph (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 same vein and 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.

This study presents the techniques and principles that can assist learners in having a meaningful and effective communication and learning experience in their online courses. First, Mayer (2014) defines meaningful learning as the state of deep understanding of the knowledge learned. The authors also describe multimedia as learning from visuals and text, e.g., pictures and words. The main principle of CTML is for learners to create and construct semantic connections between those two types of knowledge.

The CTML theory suggests that learners construct knowledge from multimedia presentations by connecting visual and verbal information in their long-term memory. To facilitate deep learning, the CTML proposes that new information should be presented using both pictures and text rather than relying solely on either one (Mayer, 2014). According to the CTML, multimedia instruction should encourage learners to participate actively and construct mental representations of the presented material. Therefore, when teaching adult learners in an online environment, information should be presented using both pictures and text simultaneously, as per the CTML theory.

In addition, the CTML distinguishes between five cognitive processes that may occur during learning with digital materials: selecting relevant words (1) and images (2), organizing

selected words (3) and images (4), and integrating verbal and pictorial mental models with prior knowledge (5) (Schneider et al., 2022). Mayer (2014) also noted that these cognitive processes typically occur for each section within the multimedia message (Schneider et al., 2022).

Rudolph (2017) posited that during the learning process, learners can only learn and process a limited amount of knowledge within a given time; the author also explained the effect of internet cognitive fatigue (ICF), which results from exposure to a computer screen for long hours. According to CTML, multimedia instruction design can improve learners' cognitive ability and help combat ICF. Research results found that creating a concise lesson, providing room for breathing for the learners, using symbols and highlights for critical concepts, and reducing extraneous load help learners perform better in their learning.

According to Mayer, three assumptions are related to the CTML, as shown in Appendix A, as it represents how our memory works while receiving multimedia instruction. There are five columns and two rows. The latter indicates the information-processing channels "auditory/verbal channel ... and a visual/pictorial channel" (Rudolph, 2017, p. 44), while the five columns represent the modes of information in a multimedia presentation, namely, words and pictures, physical representations that learners use through their ears and eyes to access this sensory information. Thus, the cognitive processing of which is represented by the flowchart in Appendix A represents cognitive processing.

Related Literature

From the outset, learning is not a simple process; it is a complex one that entails many factors, like cognitive presence, social exchange, gender, voice, and nonverbal communication (Castro-Alonso et al., 2021). With the world moving away from the physical classroom to different media platforms, one of the key aspects of learning needs to be added: social

interaction. CTML suggests a group of principles or agents to be applied in the online course design to substitute for the lack of social interaction and personal presence in virtual learning (Castro-Alonso et al., 2021).

The term *multimedia* refers to different things in our daily lives. Many theories define it differently; according to Mayer (1997), multimedia entails three areas: sensory modalities, presentation modes, and media delivery (Şendurur et al., 2020). 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). The aim of this study is to explore the theories and principles that could help in improving knowledge transfer, retention, and production. In order to do so, these key theories are examined here.

Mayer's 12 Principles of Multimedia Design

Richard Mayer's 12 Principles of Multimedia Design are a set of principles, or guidelines, for creating effective multimedia instructional learning materials. These principles are founded on cognitive psychology studies. They are expected to help teachers, course designers, and educators develop more attractive, efficient, and effective materials for learners to learn better and transfer this knowledge learned into the learners' long-term memory. Based on those principles that Rudolph (2017) expanded on, learners should better retain and be able to produce the information presented to them in those multimedia lessons.

The first principle is the Multimedia Principle, which states that people learn better from words and pictures than from words alone. Rudolph (2017) gives the example of a talking head

within a PowerPoint presentation, but this could also include the co-activation of the other senses, such as touch and smell. In online courses for L2 learners, effectively utilizing pictures and words together promotes productive language processing.

Second is the Contiguity Principle, which suggests learners learn better when words and images are presented in close proximity. According to this principle, placing words near corresponding pictures or videos can help create a strong association between the word and its meaning, thereby enhancing the learning process. This principle is based on the idea that the human brain processes information in two separate channels: one for visual information and another for verbal information. By presenting verbal and visual information together, the Contiguity Principle takes advantage of both processing channels, making it easier for learners to remember and understand the material.

Thirdly, the Coherence Principle explains how people learn effectively when extraneous words, pictures, and sounds are excluded. In this case, less is more, and learners must not be distracted or bogged down with unnecessary details included by overzealous instructors trying to be all-comprehensive and exhaustive in embellishing their previous slide. Applying this principle in real life is as simple as keeping presentations and course design simple and to the point.

Next is the Signaling Principle, which highlights important key concepts and vocabulary words or provides color-coding. The thinking behind it is that people learn better when we include key information that highlights the organization of the essential material. The advent of computer graphics enables easy addition and manipulation of arrows, animated arrows, spotlights and highlights, and a plethora of other visual and textual cues that facilitate cognition and memory success.

The Redundancy Principle is about avoiding redundancy in course material and useless repetitions. People learn better from adding graphics and narration only rather than from graphics, narration, and on-screen text. The addition of on-screen text, which adds no new information to the graphics and vocal instruction, only serves to draw the learner's focus away from the message rather than reinforcing it. If a picture is worth a thousand words of text, it may be worth leaving the text out.

The Personalization Principle ensures that background information, examples, and anecdotes learners can relate to are provided. Furthermore, when designing multimedia lessons, it is better to use conversational words rather than formal ones. An example of this is using the second-person personal pronoun, you, rather than the impersonal and sometimes imperial third-person pronoun (they, one, etc.). With technology, animated avatars, deep fakes, and holographic projections take personalization to another level.

Breaking up new vocabulary into smaller chunks comports with the Segmenting Principle. People learn better from a multimedia lesson presented in user-paced segments rather than one continuous unit. While a monolithic hierarchical outline or nomenclature could indeed provide a helpful overview occasionally, bite-sized units are recommended, especially if learners get to control the pace of their progress through a progress bar or breadcrumb links.

The Pre-training Principle suggests that people learn better when they get prior training on the main concepts. With most smartphones having screen capture in the video as a function, the creation of such instructions has literally come within reach of the average phone user. Instructors can create mini pre-training video clips on setting up a Gmail or Blogger e-portfolio account for new learners joining their class without interrupting the lesson.

A beneficial method is the use of a combination of images, text, and audio to present new vocabulary, something supported by the Modality Principle. It states that people learn better from graphics and audio narrations than animation and on-screen text. Instead of crowding the visual channel with printed text and visuals, this principle seeks to spread the load between the visual and auditory channels by moving text from print mode to spoken mode.

The Temporal Contiguity Principle helps people learn better by presenting words and pictures continuously rather than one after the other. It is the difference between a live human agent interacting simultaneously with a customer in real-time over Zoom or in person versus the turn-taking with an impersonal automated phone menu. Temporal contiguity should enhance learning when information is given to the memory at the same time.

The Spatial Contiguity Principle suggests that learners learn better when corresponding words and pictures are presented closely on the page or screen. Examples of incongruity would be legends located outside the graphics they are supposed to label rather than layered directly over the parts of, say, the brain or machine they represent.

According to the Voice Principle, people learn better when a friendly human voice is used rather than a machine or automated voice. Notwithstanding the erosion of the line between machine and human voices, the line is still often detectable, particularly in suprasegmentals and intonation. Nevertheless, this principle may soon be eliminated as intonation patterns are enhanced and the customizable aspects, such as for various accents and pitches and teaching utility of robot voices, are deployed.

Lastly, the Image Principle suggests that adding the speaker's image to a multimedia presentation does not necessarily enhance the learning experience. According to this principle, it is unnecessary to have a "talking head" installed on the screen if there is a voice-over with

excellent graphical images. This principle is based on the idea that learners have limited cognitive resources, and adding a speaker's image to a multimedia presentation can be distracting and onerous, leading to cognitive overload. This overload can reduce the efficiency of the multimedia presentation as a learning tool.

In my study, learners have been exposed to both synchronous and asynchronous learning. Synchronous online learning involves connecting with learners online using any media platform, forming a sense of connectedness between learners and their teachers (Parrish et al., 2021). In asynchronous learning, in-person or contemporaneous communication is not required. Therefore, asynchronous learners can learn on their own time and schedule (Parrish et al., 2021). Finally, since online learning covers both synchronous and asynchronous communication (De Paepe et al., 2019), CTML, by definition, is effective in both synchronous and asynchronous environments, which made applying CTML very beneficial to my study.

Cognitive Load Theory

One of the key assumptions in CTML is limited working memory capacity. According to Sweller's (2010) CLT, human brains can only manage a limited amount of information. Thus, learning should be designed not to overload our working memory since CLT's purpose is to reach efficient learning models through a set of principles that guide the process (Şendurur et al., 2020).

CLT is a theoretical framework that explains how the cognitive system processes information and how learners can avoid cognitive overload when learning. CLT is based on the notion that there are various types of cognitive load and that each type of load affects learning differently. The three types of cognitive load proposed by CLT are intrinsic, extraneous, and germane load (Szulewski et al., 2020)

The inherent complexity of the material being learned is known as an intrinsic load. For example, a complex math problem or a difficult foreign language grammar rule would have a high intrinsic load. Intrinsic load is thought to be essential for learning because it reflects the task's complexity and the extent of mental effort required to understand it. Extraneous load, on the other hand, refers to any external factors that interfere with learning, such as environmental distractions or ineffectual teaching methods. These factors can increase the amount of mental effort required to learn, and it is thought to harm learning because it distracts attention and pulls cognitive resources away from the task at hand (Şendurur et al., 2020).

Finally, the mental effort required to combine new information into existing knowledge structures, or schemas, is referred to as germane load. Schemas are mental frameworks that organize and store knowledge, and the effort required to modify or update existing schemas in light of new information is reflected in the germane load. Germane load is thought to be necessary for learning because it reflects the active processing of further information and the formation of meaningful connections between new and existing knowledge (Şendurur et al., 2020). CLT aims to prevent cognitive overload (Choi & Lee, 2022), which occurs when the amount of mental effort required exceeds the capacity of working memory. Working memory is a limited-capacity system that temporarily stores information while it is being processed. When working memory is overloaded, cognitive resources are diverted from learning, resulting in poor performance and comprehension. CLT provides a framework for designing instructional materials and methods that optimize learning and prevent cognitive overload by understanding the various types of cognitive load and how they affect learning. Instructional designers, for example, can reduce the extraneous load by reducing distractions and presenting information

clearly and concisely, as well as encouraging learners to actively engage with the material and incorporate new information into their existing schemas (Choi & Lee, 2022).

When learners face a high element of interactivity, lack domain-specific prior knowledge, and must thus build and automate new mental models, they face a high intrinsic cognitive load (Schneider et al., 2022). In order to prevent cognitive overload, care must be taken to distinguish relevant from irrelevant concepts, appropriate from inappropriate visuals and terms, academic knowledge from applied ones, essential information from redundant ones, and novice students from experts (Şendurur et al., 2020).

Cognitive processing requires these three steps for it to succeed: selecting relevant information, constructing mental representations, and incorporating prior knowledge (Choi & Lee, 2022). Effective use of cognitive resources is critical for successful learning since working memory has limited capacity. Therefore, managing cognitive load is important for instructional design and education research. Optimum learning is obtained when learners have sufficient working memory capacity to manage cognitive load (Choi & Lee, 2022).

Previous studies show that cognitive load not only explains individual learning differences but also informs the design of learning systems (Choi & Lee, 2022). To attain successful problem-solving and learning, the total of these three loads must be at most working memory capacity. According to CTL, in order to achieve efficient learning, the design should come in smaller chunks, have a straightforward layout, avoid too many distractors to build upon their current understanding, and engender more effortless knowledge transfer (Şendurur et al., 2020).

Szulewski et al. (2020) showed that the CTL could be used to transfer complex knowledge since it is rooted in the understanding of memory capacity, both limited and

unlimited, and the human cognitive construction. CTL has informed my study because its architecture allows learners to process new information in the limited working memory capacity before transferring this knowledge to long-term memory, where it has unlimited capacity and duration (Szulewski et al., 2020).

Once this knowledge is stored in long-term memory, this knowledge can be retrieved and transferred back to working memory to generate action (Szulewski et al., 2020). Learners can store their new knowledge, e.g., productive vocabulary, in their long-term memory, transfer it to the working memory when needed, recall it without raising the extraneous load, and increase capacity for the germane load to help learners construct knowledge in multimedia learning (Choi & Lee, 2022).

Chen et al. (2011) modernized cognitive load theory by incorporating prior knowledge and metacognitive load into the conceptual framework. Valcke (2002) devised a model for cognitive load theory that emphasized the importance of prior knowledge in schema construction and argued that learners exert effort in both schema construction and monitoring of this activity, so the overall germane cognitive load should be linked to the last activity, which was termed metacognitive load.

The visual illustration of the elements affecting cognitive load in educational environments provided by Valcke's (2002) uploaded model may help researchers and teachers learn more about how to optimize instructional tactics and resources to lessen superfluous load while boosting germane load by taking into account the relationships between intrinsic, extraneous, and germane loads. It is essential to note that Chen et al. (2011) used a model as confirmation for their study conclusions, indicating the model's applicability and importance to

the area of education. This methodology can help teachers create lessons that encourage greater comprehension, information retention, and application.

Dual Coding Theory

The second fundamental assumption in CTML is that of dual channels in our brains. Canadian psychologist Allan Paivio proposed the Dual Coding Theory (DCT) (Yanasugondha, 2017), which claims that people learn better when they use more than one memory aid. Yanasugondha (2017) asserted that the research results confirmed that DCT promotes learning using mental imagery, pictures, and referent items.

Cuevas (2016) advocated for DCT as the better theory to account for teachers' practical application, students' retention, and researchers. The author mentioned that this theory has more evidence-based data than the previous theories to ensure its validity. DCT proposes that there are two pathways in the brain, one visual and one verbal and that if both are used, it makes encoding information into long-term memory much more accessible than using just one pathway (Cuevas, 2016).

Cuevas (2016) also mentioned that based on empirical data, DCT had proven results in tangible improvement in learning retention. In a study that was conducted to test DCT's effectiveness, the researchers contrasted concrete versus abstract word retention. The results revealed that participants were able to retrieve concrete words better than abstract words because the former was connected with a visual or imaginary visual plus the verbal words used, whereas the latter, being abstract, was communicated through verbal words only (Cuevas, 2016). Those findings proved to be persuasive, being rooted in empirical research.

Although there is much literature supporting DCT, there have been some conflicting findings regarding its divergent connection to the two brain hemispheres. Cuevas and Dawson

(2018) also raised some questions regarding the DCT. The authors reviewed different literature and admitted that there might be only one pathway for both visual and verbal storage in the brain rather than two pathways. More research is definitely required in this area to prove either hypothesis. In fact, CTML builds on DCT by proposing how different information modalities, such as text, images, and audio, can be combined to improve learning. According to this theory, people process information through two distinct channels: visual/pictorial and auditory/verbal. When information is presented simultaneously through both channels, it can be quite effective for learning because it reduces cognitive load and allows learners to process efficiently.

In education and especially virtual learning, it is essential to identify a theory or a method to be applied in the curriculum to help learners learn better and accelerate their knowledge and cognitive power. Kolesnikova (2020) mentioned that nowadays, the content and curriculum in schools had been adapted to student's needs and not vice versa. Kolesnikova (2020) highlighted the fact that knowledge is considered a way of enhancing and improving economic growth. The author confirmed that in today's digital age, learners had become participants in forming knowledge since they are the first beneficiaries.

Both CTML and DCT stress the importance of utilizing multiple modalities to improve learning. DCT proposes that information is processed and stored in various systems, whereas CTML describes how combining different modalities can result in effective learning. These theories, when combined, provide a framework for educators and course developers to create instructional materials that engage learners in multiple ways and promote deeper learning.

Related Theories

In the field of education, several theories have significantly shaped our understanding of how people learn and process information. CTML is one such theory that emphasizes the

importance of presenting information in multiple formats to facilitate learning. However, the following four theories have informed and contributed to the foundation and understanding of my study: adult learning theory, known as andragogy; Second Language Acquisition (SLA); constructivism; and Schema Theory.

CTML integrates these theories into a comprehensive framework, allowing educators and course designers to develop efficient instructional strategies suitable for a wide spectrum of learners. For instance, by presenting information in a structured and systematic manner, incorporating appropriate multimedia elements to enhance engagement, and understanding, encouraging social interactions and collaboration to promote motivation and self-efficacy, and designing activities that encourage active engagement, reflection, and critical thinking to facilitate effective learning, they can create multimedia learning experiences that arrange cognitive load.

A meta-analysis study was conducted to test the difference and effectiveness between multimedia agents and other social factors, such as facial expression, gesturing, voice, and motion effectiveness in learning and knowledge transfer (Castro-Alonso et al., 2021). The results show that after applying multimedia pedagogical principles in the course design, the social factors mentioned above were irrelevant in their effectiveness. Moreover, results also showed that learning online using multimedia principles and tools was efficient and effective than learning without those agents (Castro-Alonso et al., 2021).

Andragogy

Malcolm Knowles, an American adult educator, proposed the concept of andragogy. Andragogy is also known as the theory of adult learning (Knowles, 1978; Tymchuk et al., 2021). Adult education gives special consideration to the contributions made by each student

individually and aims to coordinate these contributions into some sort of communal goal (Knowles, 1978). Andragogy refers to teaching adult learners who are assumed to be motivated and self-directed (Carter et al., 2017). Andragogy, as a theory, was based on the principles of constructivism, and the latter, stresses the importance of a student-centered and authentic environment for meaningful language construction. Additionally, applying metacognitive strategies in online course design assists in the encoding and retrieval methods and helps in building new habits, either for recalling prior knowledge or presenting different methods to retrieve information (Dirksen, 2016).

According to Andragogy, adult learners have entirely different motivational desires and learning incentives from children based on their needs and interests (Knowles, 1978). Therefore, adult learners learn when personalized education, self-knowledge, and lifelong learning concepts are applied to course design (Loeng, 2017). When course design fails to engage learners, especially adult learners, who may face more barriers than children in exploring the online platform, the result is that many drop out of school (Windisch, 2016).

Consequently, my study aims to find ways to engage learners and apply online course design tools that help them feel engaged, learn better, retain information effectively, and stay motivated. After consulting contemporary literature, applying Mayer's 12 principles in online course design should help learners' knowledge transfer (Wang et al., 2020). A meta-analysis study showed that relatively more transfer happened with more learners' freedom in performance tests as to knowledge tests, in procedural tasks versus problem-solving, and for learners with previous task experience (Carolan et al., 2014), which can fall under Mayer's pre-training principle.

The previous meta-analysis study stimulated the idea of engaging long-term memory in the learning process so that the brain can engage cognitive skills for knowledge retention and transfer. According to the Andragogy theory, microlearning is an effective technique that depends on how learners take responsibility for their learning and utilize learning strategies at their own pace, especially when training for complex skills (Shail, 2019).

Therefore, adapting, improving, and enhancing online course design to suit the adult generation's technical, intellectual, and emotional skills will, in turn, expand their chances and opportunities to find employment and participate in a constantly changing and dynamic society (Garcia et al., 2021). Accordingly, my study should benefit instructors and course designers by helping them identify learners' and instructors' needs, invoke CTML, and apply multimedia learning principles in online courses for L2 learners.

Second Language Acquisition

The second theory that informs my study is SLA; Stephen Krashen, a linguist and educational researcher, proposed several hypotheses that were influential in SLA research. For my study, it is crucial to consult SLA theories and methodologies to understand how L2 learners acquire a new language. Language acquisition and language learning are distinct concepts that Krashen distinguished. In contrast to learning, Krashen claimed that acquisition is a subconscious process. Krashen stressed that while both are important in the development of second language abilities, acquisition is more important since it results in linguistic fluency because it requires the use of spontaneous language (Krahnke, 1983).

Numerous studies have been done in the area of SLA, yet the learning and teaching of vocabulary have yet to be addressed in SLA research (Coady, 1997; Davis, 1989; Gass, 1987; Zimmerman, 1997). Yu et al. (2021) argued that acquiring a second language could be examined

from two different angles: the knowledge of the target language (TL), which is grammar and vocabulary, and processing skills, which means how fast a person can comprehend a statement.

L2 learners need a certain amount of vocabulary acquisition to communicate effectively in the TL (Davis, 1989; Gass, 1987). Research shows a strong positive relationship between higher language proficiency and language production accuracy (Li, 2021). The more L2 learners increase their language proficiency and productive vocabulary repertoire, the better they can produce in their TL. Furthermore, learners who master vocabulary well can exhibit better language performance (Wang et al., 2020).

Interestingly, some researchers suggested that a literate L1 English-speaking individual can use about 20,000-word families, which inflicts a real disadvantage for ESL learners (Laufer, 1992; Nation, 1993, 2001). Therefore, learners must show conscious attempts to learn and improve their vocabulary acquisition while exposing themselves to the TL through different contexts. Many ESL learners despair that they need to reach a native-like ability to gain employment in their fields, which can take much time to achieve. Adding to that, Kim (2008) confirmed that based on one experience the author conducted, the outcomes demonstrated that increased learner engagement during the task led to more successful initial vocabulary acquisition and improved retention of the newly learned words.

From the communicative side, Lightbown and Spada (2013) explained that social interactions are one of the key factors in developing L2. Moreover, learning a language is a combination of social and personal efforts collectively, and ultimately, people vary in their learning styles, speed, and strategies (Ortega, 2014). According to Lightbown and Spada (2013), a reasonable amount of social interaction needs to be involved for L2 learners to acquire a new language.

The first challenge is that in online learning, there are no social interactions available; hence, developing those interactive activities and opportunities for online courses is vital. Creating positive interactions, discussion boards, instructor dialogue, multimedia design, and self-reflection activities have been identified to be very successful techniques in improving learners' learning experiences in online courses (Andrade, 2017).

The second challenge is the continuous argument in SLA over its emphasis on creating communicative classroom activities, which always seems to lead to prioritizing grammar acquisition more than productive vocabulary skills (Doughty & Williams, 1998; Long & Robinson, 1998). There is a gap in the literature on assessing and enhancing L2 learners' productive vocabulary skills. This is the area where my study seeks to explore and investigate the most effective multimedia tools that can improve the productive vocabulary skills of adult L2 learners.

SLA research shows that there is a myriad of different factors that can affect acquiring a new language. Ortega (2014), for instance, explains that other psychological factors affect SLA. Personality traits are the first factor discussed, and the second factor is speaking styles, which are measured by fluency effects. Anxiety is the third factor; learners with high anxiety levels receive lower grades. Nevertheless, some tension can be advantageous for some learners as it drives them to work harder and achieve better results.

The fourth factor is the willingness to communicate (WTC). Once again, this is hard to assess and achieve in virtual settings, yet Ortega (2014) believes that immersing in broader communication experiences and different contexts can nurture different situations for L2 learners' use. For example, semi-structured discussion boards, breakout rooms in video

conferencing platforms, and class blogs can simulate similar settings to accomplish similar results.

Parrish et al. (2021) discussed fostering the social and cognitive presence for L2 learners to acquire the TL. Results showed that teaching presence followed by social and cognitive presence is the way to achieve the above goal. When L2 learners lose engagement and the motivation to learn, knowledge acquisition and retention are challenging to achieve (Babić, 2017). Warner et al. (2019) claimed that encouraging learners' interactions do not improve learning outcomes. However, another factor that seemed to enhance learning efficiency was the adaptation of online instruction to match learners' prior knowledge.

Talking about vocabulary retention, Wang et al. (2020) confirm that vocabulary retention is one of the most arduous tasks for L2 learners. Numerous factors affect this phenomenon, such as the lack of exposure to the target language, limited cognitive ability, L1 interference, and level of motivation and interest. However, in today's technological era, utilizing educational technology can elicit effective vocabulary retention and learning. Students learning performance can improve by creating and utilizing the proper technical resources and procedures (Ipek & Ziatdinov, 2018).

Wang et al. (2020) pointed out two main approaches to improve vocabulary retention for L2 learners in online courses: multimodal design and spaced repetition. The former is underpinned by CTML, where learners are exposed to both visual and verbal channels, which improves memory retention. The latter provides regular, timely, and steady exposure to the TL, where learners can maximize their learning and enhance their vocabulary retention (Wang et al., 2020).

Constructivist Learning Theory

This study is also guided by the constructivist learning theory, which is based on the idea that the learner constructs knowledge through active engagement with the learning process.

Constructivism has been linked to the work of two well-known educational psychologists, Jean Piaget and Lev Vygotsky. As online learning becomes increasingly prevalent, it is essential for course developers to utilize the most effective teaching strategies to improve the retention of information for adult learners. According to this theory, implementing certain activities can stimulate self-directed learning (SDL) and improve student academic behaviors (Chukwuedo et al., 2021).

In reference to Constructivism theory, learners build their knowledge by connecting new information to their existing knowledge and experiences. In other words, learning is a process of constructing meaning rather than a passive reception of information. The constructivist theory emphasizes the importance of learner-centered instruction, where learners actively participate in the learning process by using their past and present knowledge to develop new ideas or concepts (Chukwuedo et al., 2021). Constructivism places greater emphasis on learning than teaching, enabling students to develop skills, attitudes, and processes through practical experiences.

Learners' autonomy is one of the factors that play a role in active learning. Raw and Ismail (2021) discussed learners' ability to take the initiative and responsibility for their learning, which is what they call learner autonomy. The concept of learner autonomy refers to the learners' willingness and ability to take charge of their learning, which not only fosters self-regulated learning (SDL) but also directs them to successful language acquisition outcomes. Based on constructivist learning theory, learners learn better when they practice SDL, which is crucial in

online distance learning, where learners learn without an instructor's immediate, synchronous assistance.

Another critical aspect of the constructivism theory informs my study is that it has been proven that using scaffolding techniques, especially in a group setting, can enhance both speaking abilities and vocabulary knowledge. This means that course writers, curriculum developers, and language instructors can apply Vygotsky's social constructivism and socio-cultural theory concepts to broaden and improve learners' zone of proximal development (Homayouni, 2022). Since the goal of this study is to find ways to improve adult learners' productive vocabulary skills, Homayouni (2022) highlighted some of the fundamental principles for applying constructivist theory when designing courses, as follows:

Active Learning

One of constructivism's fundamental principles is that learning is an active process. Course developers can apply this principle to online courses by incorporating interactive activities such as quizzes, discussions, and simulations. These activities encourage learners to engage with the content and construct their own knowledge actively (Homayouni, 2022).

Personalized Learning

According to the constructivist approach, personalized learning acknowledges that students actively build their knowledge by drawing from their prior understanding and experiences. Teachers, course designers, and content writers can tailor the learning experience to each learner's unique needs to put this theory into practice. According to Homayouni, learning can be achieved through the use of adaptive learning technologies, which dynamically adjust the material and pace of learning to suit the learner's development and desired learning style (2022).

Collaborative Learning

Collaborative learning is another key principle of constructivism. Course developers can apply this principle in online course development by incorporating collaborative activities such as group discussions, peer reviews, and group projects. These activities encourage learners to work together to construct their knowledge, share their perspectives, and learn from each other (Homayouni, 2022).

Problem-Based Learning

Problem-based learning is a teaching method that emphasizes the active construction of knowledge by solving real-world problems (Homayouni, 2022). Instructional designers can apply this principle in online course development by designing activities that require learners to solve real-world problems related to the course content. These activities encourage learners to actively engage with the content, apply their knowledge to real-world situations, and construct their understanding.

Constructivism emphasizes active learning, personalized learning, collaborative learning, and problem-based learning, all of which have been shown to increase the retention of information, promote the development of critical thinking skills, and enhance learners' motivation and engagement in the learning process. By personalizing their learning experience, participating in collaborative activities, and engaging in interactive activities and problem-solving, learners feel more connected to the content and motivated to learn. Then, they can develop their ability to analyze information, evaluate evidence, and draw conclusions (Homayouni, 2022).

In short, constructivism provides a valuable framework for the course developers, to design online courses that improve vocabulary retention for adult learners. By applying the

principles mentioned above that coincide with CTML, course developers can enhance learners' retention of information, critical thinking skills, and motivation.

Schema Theory

The last theory that addresses knowledge retention and acquisition is the schema theory. A psychologist called Frederic Bartlett proposed schema theory; however, many other cognitive psychologists, like Jean Piaget, Richard Anderson, and Allan Collins, have extended and expanded on the concept of schema (Pankin, 2013). A schema is an organized unit of information based on prior experience that directs understanding and actions in the present. Schemas are dynamic and develop over time, and they have a significant impact on how people perceive incoming information. Declarative and procedural knowledge can be stored in schemas, with declarative knowledge being factual and procedural knowledge being connected to how to complete a task (Pankin, 2013).

Although the Schema Theory and CTML are related in that they both emphasize the importance of prior knowledge and mental representations in learning, CTML applies these concepts specifically to the design and use of multimedia learning materials. CTML builds on the Schema Theory by proposing that learners use their existing schemas to construct mental models of multimedia materials, and this is how both theories are related.

According to CTML, the effectiveness of multimedia learning is determined by how well the materials support learners' schema construction processes and how well they are designed to facilitate the integration of new information with prior knowledge. Schema Theory and CTML are two related but distinct theoretical frameworks that are frequently used in cognitive psychology and educational technology (Nassaji, 2002).

According to the Schema Theory, people actively construct mental frameworks, or "schemas," based on prior knowledge and experiences, to organize and interpret new information. These schemas direct our attention, perception, and memory while also assisting us in making sense of new information by connecting it to prior knowledge (Nassaji, 2002). Bartlett (1932) first proposed the concept of schema to account for how information in anecdotes and experiences is reconfigured in memory for future recall. Bartlett (1932) believed that understanding and recalling occur predominantly in the context of prior experience and with reference to relevant information in memory (Nassaji, 2002).

According to Nassaji (2002), the concept of Schema Theory has broad theoretical applications in cognitive psychology. The concept, in various forms, has been used to describe the structure of knowledge in a variety of domains. Schemata have been used to describe the structure of knowledge of ordinary events. The term has also been used to describe the structure and organization of linguistic and discourse systems.

According to McVee et al. (2005), schema theory is a model that explains how human memory stores knowledge; Schema theory depends only on prior knowledge; therefore, in terms of adult learning, schema theory suggests that learners are better able to retain new information if it is presented in a way that connects to their existing knowledge and experiences. This means that educators should aim to activate and build upon learners' existing schemas by presenting new information in a way that is relevant and meaningful to their prior knowledge and experiences.

CTML, on the other hand, is concerned with how people process and retain information presented in various multimedia formats such as text, images, and audio. According to this

theory, learners can process and retain information better if it is presented in multiple formats that complement each other and align with the learners' existing schemas. The connection between schema theory and the cognitive theory of multimedia learning lies in the idea that both theories emphasize the importance of connecting new information to existing knowledge and experiences. By doing so, learners can better organize and retain the new information, which ultimately leads to better learning outcomes. When designing instructional materials, educators can use these theories to create materials that are optimized for adult learners and that promote effective learning.

Potential Gaps

The use of CTML in knowledge retention or acquisition has gained significant attention in recent years; however, CTML has no proven record in achieving the required effect when aiming to improve ESL learners' productive vocabulary skills retention. This study aims to investigate the effectiveness of CTML in enhancing productive vocabulary retention among adult learners and explore learners' perception of the theory's effectiveness.

However, as with any research study, there are potential gaps that could be identified, which could affect the validity and generalizability of the findings. Some of the potential gaps that could be identified in this research study include the sample size, the type of multimedia used, the duration of the intervention, and the measurement tools used to assess vocabulary retention. Each of these gaps could have a significant impact on the findings of the study, and it is essential to address them to ensure that the study is valid, reliable, and relevant to the adult learner population. In this section, we explore these potential gaps and their potential impact on the research study.

One of the first gaps is the exploration of employing multimedia to teach productive vocabulary skills to adult ESL learners, which is an unexplored field of research. There is a large gap in the literature, making it difficult to create a robust theoretical foundation for the subject. Due to a scarcity of relevant literature on this topic, a full literature review may be required to uncover theories and best practices involving multimedia tools and resources such as video, audio, and interactive exercises. Furthermore, consulting subject matter experts in this field may provide insights and recommendations on the use of multimedia for vocabulary development among adult ESL learners.

Secondly, an additional gap that requires investigation pertains to individual differences. Although some research has been conducted into the effectiveness of multimedia learning in boosting vocabulary acquisition, the corpus of empirical information regarding the exact strategies and approaches that prove most beneficial for our specific target learners remains limited. As a result, there is a scarcity of optimum approaches for teaching productive vocabulary skills to second language (L2) learners in online courses.

It is critical for the curriculum developers, content writers, and researchers to collaborate with schools' administrators, teachers, and educators to conduct original research in order to bridge this gap. In other words, subject matter experts should conduct more research on individual differences that are associated with vocabulary retention, and then, the research data can supply recommendations that are solidly established in evidence. To close this gap and develop evidence-based recommendations for teaching productive vocabulary skills, the study needs to conduct original research.

Identifying a gap in the existing literature is critical for developing effective teaching strategies in adult SLA. The third gap revealed in the current study is the lack of a practical method for using cognitive theory in ESL instruction. Although cognitive theory provides a thorough framework for understanding how people learn, its use in actual teaching tactics is little understood. Thus, a link between theory and practice must be created by incorporating both professionals and adult ESL students in the creation of efficient online teaching strategies.

The current study proposes a collaborative strategy between researchers, practitioners, and adult ESL learners to attain this goal. Working closely with practitioners to identify realistic teaching strategies that can be applied in real-world contexts is part of this strategy. Furthermore, the study includes adult ESL learners from a variety of language and cultural backgrounds, as well as learning styles and preferences, to ensure that the established multimedia design can account for these differences. Such an approach is crucial in bridging the third gap and improving the field of ESL learning. The proposed study makes an important contribution to improve the standard of online ESL learning and instruction, which is advantageous to both adult ESL learners and practitioners. It does this by establishing a practical application of cognitive theory.

This research examines how these individual differences influence the effectiveness of multimedia learning for productive vocabulary skills. Using multimedia presentations may not be sufficient to address all learning styles. This could necessitate conducting a needs assessment to identify the specific needs and preferences of the target learners, then adapting the tools needed and teaching strategies.

A significant gap that would face any research study is measurement and assessment. Measuring the effectiveness of multimedia learning for productive vocabulary skills may be difficult as appropriate assessment tools that capture the nuances of vocabulary acquisition in adult learners may need to be developed and validated. To assess the effectiveness of various teaching strategies and the impact of multimedia tools on productive vocabulary skills, the study may need to use a combination of qualitative and quantitative methods to explain the results.

Moreover, generalizability could be a separate gap in this study. Beyond the specific context of adult ESL learners in this organization, the study may need to consider how far its findings can be generalized to other populations and settings, given that only one case study takes place in one location and with one group of students. Additional research may be required to validate the effectiveness of multimedia learning across various learner groups and educational contexts. The study may need to establish clear criteria for selecting study participants and collect data on various demographic and contextual factors that may impact the findings' generalizability.

An additional gap in the literature review regarding how L2 learners' cognitive presence relates to the need for authenticity in curricula and instructional design. CTML promotes maintaining authenticity by ensuring that instructional design reflects the real-world contexts and situations that learners are likely to confront outside of the classroom. This means that content writers and instructional designers have an essential role to play in constructing more profound knowledge and facilitating higher order thinking skills that help students connect their learning to the real world while adding more case studies and real-life scenarios to accomplish this authenticity. The importance of authenticity in instructional design has been highlighted in a study by Parkay et al. (2019).

The last foreseen gap in the literature review is concerned about learners' disengagement and minimal cognitive presence in online courses. Online courses have become increasingly popular in recent years. Still, there is evidence to suggest that learners often need help to stay engaged and motivated in these courses, leading to poor outcomes. This issue is especially pertinent for L2 learners, who may find it challenging to sustain a cognitive presence in online courses due to language barriers and other factors. Scarpin et al. (2018) highlighted the need for curriculum developers of the online course to indicate this issue and find ways to stimulate cognitive presence among learners.

The current study aims to bridge these gaps in the literature by exploring and incorporating Mayer's 12 principles in online course design for our target learners. By doing so, I aim to promote cognitive and social presence, improve knowledge transfer, enhance memory retention, and improve productive vocabulary learning among L2 learners. By addressing these gaps in the literature, the study contributes to a better understanding of the factors that influence L2 learners' success in online courses and to inform the development of effective instructional design strategies.

Summary

Chapter Two of this study highlights the theoretical framework that informs my research on productive vocabulary retention among adult L2 learners. The literature review also emphasized the importance of knowledge retention for adult L2 learners, an area that is yet to be fully explored in the literature. Arghode et al. (2017) noted that while there is some research on knowledge retention among L2 learners, there is a need for more studies that investigate the factors that influence retention, particularly for productive vocabulary skills.

This chapter utilized the CTML and its related literature as the main theoretical framework that informs the study. Other major related theories that informed the development of CTML, such as Constructivist and SLA theories and more, are also discussed in depth. These theories provided a foundation for understanding how people learn better, acquire the information presented to them, and, most importantly, retain the knowledge they learned. In addition, those theories offer a complete picture of multimedia tools, principles, and materials that can be used to enhance learning outcomes.

This chapter has filled some knowledge gaps in the literature on adult L2 learners' retention of productive vocabulary. Despite the abundance of study that has been done in this area, more investigation is still needed, especially when it comes to adult L2 learners. Another area that needs attention is the limited use that has been reported of CTML in online courses. CTML has been demonstrated to be a highly effective method for enhancing information retention and transfer. Additionally, empirical research is required to support the validity of CTML's usefulness in enhancing adult L2 learners' retention of productive vocabulary.

This study suggests using Myers' 12 multimedia principles in online courses as a way to fill some of these gaps. The study intends to improve multimedia instruction's efficiency in encouraging knowledge retention and transfer among adult L2 learners by incorporating these principles into the design of instructional materials. With the use of this strategy, it is envisaged that a deeper understanding of the mechanisms behind effective multimedia instruction in supporting productive vocabulary retention for adult L2 learners can be attained. The results of this study could ultimately have a significant impact on the creation of better instructional strategies and materials that can aid adult L2 learners in their efforts to learn and retain useful vocabulary.

In conclusion, Chapter Two is an essential part of the current study since it provides a thorough analysis of the theoretical foundation for the research. Its thorough examination of CTML and related theories not only adds to existing knowledge in the field but also lays a solid platform for the research problems that are thoroughly investigated in the next chapters. This chapter plays a critical role in expanding the understanding and practice of multimedia learning by setting the study within a well-established theoretical background and guiding future empirical investigations.

CHAPTER THREE: METHODS

Overview

The purpose of this qualitative embedded case study is to identify the multimedia principles in course design that promote productive vocabulary skills retention and production in online ESL classes for adult ESL learners in a fixed-locus community organization in eastern Ontario, Canada. The following sections in this chapter depict the research design, research questions, design type, the rationale for choosing this type, the study settings, and participants. The procedures and the researcher's role are also described and followed by the data collection and analysis procedures. Trustworthiness and ethical considerations conclude this chapter.

Research Design

This study uses a qualitative research method because I want to investigate and identify a social problem in a particular setting (Creswell & Poth, 2018). The method is suitable because its narrative inquiry tools account for human behavior, understanding, and perceptions through interviews and observation. Pope (2020) described case study research as capable of producing a realistic view of a context-specific environment. Qualitative design, therefore, provides the flexibility to use thick and thin descriptions to analyze and observe events and feelings.

In order to describe a social aspect that needs to be explored is a current and controlled situation that is bounded in one location and deals with a specific audience, a case study approach is used (Creswell & Poth, 2018). The study explores whether multimedia principles in course design improve L2 learners' productive vocabulary skills retention and production. The research also shows learners' perceptions of the best tools in course design and elements that would enable them to study and retain information effectively. A case study is the most appropriate type for this research since the data is descriptive, empirical, and contemporary.

Also, it has been identified as a real-world problem that needs to be explored further (Yin, 2012). Moreover, this study presents a case study type because I, as the researcher, cannot separate the phenomenon from its context. Lastly, to ensure that the results are valid, the study provides different types of evidence to validate findings for triangulation (Yin, 2012).

Finally, I chose an embedded single case study because this research concerns one group, ESL students who are studying in one neighborhood training center rather than in disparate locations. Also, different levels of data need to be explored, called subunits, such as learners' perceptions, course design elements, and different multimedia principles. Yin (2012) specified that type 2-embedded single-case design should be used in studies that involve different units of analysis within the same original case study.

Research Questions

This embedded single case study aims to explore the most effective multimedia principles in course design that would enhance L2 learners' productive vocabulary skills. Moreover, the study identifies learners' perceptions of what they feel helps them learn effectively. The following are the research questions that have been investigated in this study:

Central Research Question

How can English as a Second Language (ESL) learners transfer, retain, and produce new learned vocabulary effectively in online courses?

Sub-Question One

What is the influence of Mayer's 12 multimedia design principles on ESL learners' productive vocabulary retention and production?

Sub-Question Two

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

Setting and Participants

This section outlines the setting for this embedded single case study, accounting for the specifics of the participants, their backgrounds, and the rationale for selecting the study location. The study has been conducted in Barrie, Ontario, Canada, in a non-profit organization ABC, and I am using pseudonyms for the city and the organization. The city of Barrie is very diverse in its demographics, and many newcomers and immigrants live there due to the city's convenient facilities and amenities. ABC is one of the most prominent community organizations in Ontario due to the number of services and programs it offers, as well as having five locations spread across the Greater Toronto Area (GTA) in Ontario.

This case study focuses on the ESL program at that site as a single embedded study (Creswell & Poth, 2018). The reason for picking this setting is that I am the program manager in the organization in charge of that site. I have access to the learners' information, instructors' qualifications, and administrative data for the program. Besides giving oversight, I also do class visits, speak with learners and instructors about their challenges, and review reports and data.

Using my 20-plus years of educational and administrative expertise, as well as past and current observations and personal interactions, I discovered that many learners require assistance with their productive vocabulary repertoire. In fact, many learners revealed that it is tough to improve their communication and productive skills; hence, their productive speaking and writing skills need to be improved.

The implication for this problem is that, based on the learners' account, if the L2 students do not improve their communicative skills adequately, their chances of finding jobs in their field of profession are desperately slim. In Ontario, any regulated professional who does not complete high school in Ontario or comes from a non-English speaking country must write one of the high-stakes language proficiency exams, e.g., IELTS or TOEFL, to qualify for their license. This language requirement is not a very easy task to achieve for professionals who were trained outside of Canada. A significant component in their assessment would be the productive language skills, namely speaking and writing. According to their feedback, those two skills are the most important and most challenging for the learners to improve in a short period.

Site

The setting is a community organization located in Barrie, Ontario, Canada. ABC is a non-profit organization with over 450 staff at five locations across GTA. ABC offers a range of services to newcomers to Canada, including children and youth, employment, mental health, Housing, language training, seniors, and women-specific services. ABC offers three types of language training: LINC (Language Instruction for Newcomers to Canada), ESL (English as a Second Language), and ELT (Enhanced Language Training). The last is geared toward ESL learners who were trained in a profession in their former countries, moved to Canada, and would like to work in their field of expertise. They enter that program to learn the sector-specific terminology they need in English and improve their language and communicative skills to be able to join the workforce in their area of practice.

ESL and LINC programs are funded by the Department of Immigration, Refugee, and Citizenship Canada (IRCC) and are offered free of charge to eligible participants. Eligible learners must be 18+ newcomers to Canada and fall under the Permanent Resident or Convention

Refugee category. Both classes cover a wide range of English proficiency levels under the Canadian Language Benchmarks (CLBs) (Centre for Canadian Language Benchmarks, n.d.).

Classes are offered in-person, online, and blended on various schedules. The learners' demographics are diverse at ABC -- 75% are from China, and the other 25% are from Iran, Afghanistan, Colombia, Ukraine, and Vietnam. The age range of learners is from 20 to 70, most in their 40s. (Centre for Canadian Language Benchmarks, n.d.). Instruction is delivered by certified instructors who develop curricula according to the CLBs.

Regarding leadership and organizational structure, ABC is a nonprofit with a vertical hierarchical composition for its lines of authority. It has a precise sequence of commands from the Chief Executive Officer (CEO) to middle management and front-line personnel. Most decisions are taken by the senior management and passed on to the second management layer. Full-time front-line staff, full-time instructors, team leads, job developers, and administrative assistants are unionized, adding another level of bureaucracy to the organization.

Participants

In this single embedded case study, the participants are ESL students who attend online training. Classes run entirely online, and a range of classes are offered at ABC. Morning classes: Monday to Friday is considered full time, and evening classes are suitable for working adults. The latter runs two or three days weekly from 6:00 PM to 9:00 pm.

In the LINC program, the demographics vary as elaborated above; 85% are females, and 15% are males, all of whom are middle-aged and aged from their early thirties to late fifties. Regarding the instructors' education for employment requirements, all instructors for the LINC and ESL programs must have an undergraduate degree be members in good standing of the professional association TESL (Teaching English as a Second Language) Ontario and hold a

current OCESL (Ontario Certified English Language Teacher) accreditation as part of the hiring criteria.

Recruitment Plan

Creswell and Poth (2018) explained that a recruitment plan needs to have four components: people, events, actions, and processes, including the sample type and size that will be recruited. I have recruited participants based on their acceptance to participate in the study since participation in this study is voluntary. Therefore, I use criterion sampling to recruit participants (Creswell & Poth, 2018).

I chose this sampling type because participants are only selected from the students who attend our online LINC classes, have completed CLB level 4 and up, and are above 18 years of age; thus, they meet specific criteria (Creswell & Poth, 2018). The online consent form is sent to the sample pool of approximately 60 students, and out of the 60 people, the sample size required is between 10 and 15 participants, males and females.

Researcher Positionality

The need to work on this embedded case study emerged from years of experience, observation, and effort working with adult ESL learners in both a teaching and managerial capacity. While working in higher ed administration, I noticed a perennial challenge in adult ESL learners' vocabulary retention, production, and communicative skills, especially for the in-person classes. Consequently, that challenge is exacerbated in a virtual setting, which requires more work and effort from the instructors, administration, and learners.

Interpretive Framework

In this research, I adopted the pragmatic approach mentioned in Creswell and Poth (2018). This approach emphasizes the outcomes of research, situations, and results of inquiry

rather than the initial conditions of the study. In my study, I focus on the problems the learners are going through during the study. I also try to understand the circumstances affecting their vocabulary retention and production, whether those are personal factors, factors relating to instructions, or something different altogether.

Philosophical Assumptions

Philosophical assumptions are the pillars of any research; they provide direction and guidance for the study, and the researcher's theoretical underpinnings should be explicit (Creswell & Poth, 2018). In this study, Mayer's 12 principles of multimedia design and his CTML are the stances on which this study is based.

Ontological Assumption

Creswell and Poth (2018) explained ontological assumption as the reality based on the speaker's voice; it is a philosophical assumption that deals with what is accurate, and this cannot be separated from the mind of the doers or actors. My view of reality cannot be separated from my faith and religious beliefs as a devout Christian. In the light of God's truth, there is only one reality: God's word, the Christian Scriptures. Hence, my worldview is impacted by my core values and beliefs, which, to name a few, include walking the extra mile, lending a hand to whoever needs it when possible, not responding to evil with evil, and be honest in the eyes of God in all what you do even if no one is looking. As a researcher, I know my core beliefs and strive to embrace them to the best of my ability.

Epistemological Assumption

While conducting this qualitative study, it is hard to separate the knowledge interpreted from the interpreter, i.e., the researcher. Creswell and Poth (2018) defined epistemology as what can be considered knowledge and how to justify knowledge claims. For me, knowledge and what

counts as knowledge should be objective, based on facts, and, as much as possible, steer away from personal biases. Furthermore, for the knowledge to be justified, it must come from a reliable and trustworthy source. For me, if we are talking about worldview, it is based on God's words, past and present experiences, education, real-life situations, values, and core beliefs.

Axiological Assumption

In axiological assumption, the researcher's values and beliefs are identified and set aside to achieve objectivity as much as possible. Creswell and Poth (2018) added that in qualitative studies, the researchers should understand and identify their biases and social position, as in age, race, gender, personal experiences, and professional and personal beliefs (Creswell & Poth, 2018). In that regard, being a teacher, instructor, and advocate for e-learning for many years has influenced my view of what makes a good teacher and what makes really interactive and communicative class interactions. As an instructor for adult learners, I believe in interactive activities, the communicative approach, real-world tasks, personalized learning, micro-credentials, and student-centred learning. The abovementioned measures apply whether classes run in-person or online, yet the need to engage learners increases in virtual settings since it is much harder to control that environment.

Researcher's Role

While conducting a case study, it is essential for the researcher to ask the right questions, observe, listen, and be flexible (Yin, 2012). In this case study, my participants are outside my direct supervision since that would defy the entire research for ethical purposes. As a program manager, I make sure to request voluntary participation not from the programs I oversee but from other programs in the organization under my fellow colleagues' management or from past

students who are no longer under my supervision. Therefore, the participants are entirely free to accept or refuse participation.

I strongly advocate applying instructional design tools and techniques in online course design. The feasibility, convenience, ease of use, and practicality of online tools make me in favor of implementing web-based interactive activities and problem-based learning so that more students are engaged and involved in the modules they are learning online, which makes learning much easier to get learners to focus and perform better academically.

Procedures

This embedded case study goes through nine steps: First, I have received approval from the institutional review board (IRB) at Liberty University to conduct the study (see Appendix B), together with a preliminary site approval to submit with my IRB application. Second, I have requested approval from my ABC director to allow me to send a participation email to the LINC students and search the database of programs other than the ones I oversee (See Appendix C). On the approval form, I have summarized the outline and purpose of the study. Third, I sent an email request to my direct manager to inform her about my study and request approval to go into classes different from the ones I supervise to get some of the learners' data from the online system (See Appendix D). Both appendices used pseudonyms for the director and the direct manager.

Fourth, I have met with the other program managers to brief them about the study and discuss their concerns and logistics, such as which classes, the best time to visit, and the teacher's contact information. Once we decided on the classes, I checked with the teachers and planned the learners' interview times. Fifth, I sent a screening online form to all LINC students who have joined the program in the last two years, where they agreed to provide their emails and

names, and I sent them a recruitment email (See Appendix E) for all who have completed CLB level 4 and up. On average, around 300 ESL students have registered in the LINC program in the past two years. In that email, I have explained the purpose of the research, clarify what is requested from their participation, and assure them that this is voluntary participation, and that no compensation is provided. The consent form has been added to the email to all who chose to participate (See Appendix F).

Sixth, after the consent was signed and sent to me, I prepared a customized short video for the participants. This video introduces some new vocabulary under the theme of employment, which is followed by a follow-up vocabulary lesson that comprises 24 new vocabulary words that are taken from the video; 12 of those words directly follow Mayer's 12 multimedia principles, and the other 12 do not follow those principles. A short quiz has been added to the end of the lesson to test and capture participants' vocabulary recall and production based on which ones each participant can remember and use; all answers are captured in a Google Form.

Seventh, I sent the participants a poll with different timings to choose from and a time slot for the interview via Doodle Poll. Participants complete, digitally sign the form, and click the submit button. The system sends me all the responses, and accordingly, I start conducting the personal interviews based on the timings selected, where all interviews are conducted online via MS Teams.

The eighth step is to create an online questionnaire on SurveyMonkey and send it to learners to capture their thoughts and feedback on the entire process. Lastly, the ninth step is collecting and analyzing the data. I use a data analysis tool called MaxQDA, a thematic analysis online tool that enables me to create codes from the transcription entered and generate themes for analysis.

Data Collection Plan

This single-embedded case study collects data using physical artifacts, interviews, and online questionnaires. In respect to the first method, the physical artifacts, any complex data would benefit the study as part of the thick description for the data collection. Thick description, as described by Creswell and Poth (2018), requires having verbatim quotes from the participants that reflect their beliefs, concepts, cultural impact, and social structure. A thick description also incorporates the researcher's views.

The second method, interviews, is the most popular and required research method. Interviews attempt to learn about the participants' life and experiences and see the world from their viewpoint and through their lens (Creswell & Poth, 2018). Additionally, interviews are a great way to meet and feel the presence of the interviewees, read their body language, and ask follow-up questions.

Questionnaires are the last method described by Creswell and Poth (2018). I chose an online questionnaire method since it allows me to send it to all participants in any location simultaneously. Participants can express themselves privately without fear of being criticized, embarrassed, or challenged by their classmates.

Individual Interviews

Creswell and Poth (2018) discussed different ways of phrasing unstructured, semi-structured, or structured interview questions. In this study, semi-structured interview questions are applied. Creswell and Poth (2018) described a sequence of steps to conduct successful interviews. The steps start by determining research questions, identifying participants, choosing the type of interview that best suits the research, collecting data, following the proper interview

protocol, refining the questions, selecting a location, signing consent forms, and deciding on the transcription method.

In this research, I conduct personal one-on-one virtual interviews. In the Google consent form I send to the participants, I elicit the study details, request to join, and time proposed. The semi-structured interview includes ten questions; answers are recorded and retrieved afterward. It takes from 20 minutes to half an hour for each participant.

1. Tell me one sentence about yourself, your country of origin, your background, and how long you have been in Canada. SQ3
2. What are the reasons that made you join an English class? SQ3
3. Do you find it difficult to remember and use new words you have learned? Why? CRQ
4. What in the online lessons made it easier or more challenging for you to learn? Like images, diagrams, videos, text, pictures, and highlights? Why? CRQ
5. In some courses, they use narration or spoken explanations alongside text and visuals. Do you find this method beneficial in helping you remember and apply what you've learned? Which will be more helpful to you, a human voice or a robot voice? Why? SQ2
6. What do you think are the barriers to your speaking or writing fluently? How can you improve this? SQ3
7. When online courses break down the content into smaller, more manageable sections, do you think it helps you remember and use new vocabulary more successfully? SQ2

8. Based on the presentation you saw, did you like that mini-vocabulary lesson? Why? What was the best part and the worst part? SQ3
9. Which vocabulary did you remember the most? Why? SQ2
10. If there is anything we can add to your online course to help you remember the information effectively, what would that be from your point of view? SQ3

Questions one and two are meant to gather basic information about the participants and create a friendly rapport. Meanwhile, those questions reflect the learners' perceptions of their language proficiency level, the purpose of entering the program, and their final goals. Questions three and four aim to understand the learners' metacognitive understanding and abilities.

Questions five, seven, and nine are meant to investigate the participants' opinions on the best elements that helped them study in their online courses. I can present some options for them if they cannot explain the different items in their course design, e.g., videos, interactive activities, or word repetition that assist them in better recalling vocabulary. I have been looking to see if they recall vocabulary better using words and visuals based on DCT (Hartland et al., 2008).

Questions six, eight, and ten ask the participants about their views and perceptions of their productive skills, abilities, and limitations as fluent L2 speakers and writers and determine what else can be used in the course design to improve their vocabulary retention and production.

Physical Artifacts

Following Yin's (2012) framework, the inclusion of physical artifacts is deemed integral to the case study methodology. Within the parameters of this study, these artifacts are procured through participants' responses to a designated online assignment, which they undertake

subsequent to reviewing a video presentation and a corresponding vocabulary lesson within an online instructional module. The primary objective of this assignment is to assess participants' capacity for information recall and their ability to articulate the newly acquired vocabulary. Additionally, the assignment serves as a means to evaluate the efficacy of Mayer's 12 principles of multimedia, distinguishing those that exhibit notable effectiveness from those that do not.

Online Questionnaire

Yin (2012) explained that question words that allow complete answers should be used in surveys and questionnaires. I chose the online questionnaire method because it is convenient and saves time, cost, and effort without compromising validity. Online questionnaires can be easily modified, altered, and archived. They are a great way to gather information since they allow participants to respond conveniently. Questionnaires can be sent to as many participants as needed at any location and time.

In this study, I utilized SurveyMonkey software to create this online questionnaire.

Online questionnaires can protect participants' privacy if they are uncomfortable revealing their names. The data is gathered and compiled in an Excel sheet, and charts are created to visualize it, making it easier for me to validate, interpret, and analyze.

Below are the questions that were presented to the participants:

1. How long have you participated in online ESL/LINC classes?
 - a. Never
 - b. Less than six months
 - c. 1-2 years
 - d. More than two years

2. How frequently do you use multimedia elements (e.g., videos, interactive exercises, images, audio) in your online ESL courses to teach vocabulary?

- a. Very frequently
- b. Frequently
- c. Rarely
- d. Never

3. Do you believe you learned more new words when learning online?

- a. Strongly Agree
- b. Agree
- c. Disagree
- d. Strongly Disagree

4. How do you typically learn new words from your past experience? Please select all that apply.

- a. Writing exercises
- b. Speaking exercises
- c. Repetition
- d. Engaging in role-play activities
- e. Other (Please specify) _____

5. Which online methods or elements have you found most effective in recalling vocabulary in online courses? Please select all that apply.

- a. Videos
- b. Audio recordings
- c. Interactive quizzes- Online games
- d. Flashcards- Highlighting important parts

- e. Other (Please specify) _____
6. Can you provide an example of a specific online technique that significantly improved your vocabulary retention or production in online courses?

7. What do you find ineffective or distracting in your online ESL/LINC courses? List at least two elements.

8. What challenges, if any, do you encounter in remembering and producing new vocabulary in online courses? Please select all that apply.
- a. Limited opportunities for speaking practice
 - b. Lack of face-to-face interaction with instructors and peers
 - c. Difficulty in finding suitable vocabulary exercises
 - d. Insufficient feedback on vocabulary production
 - e. Other (Please specify) _____
9. Do you believe online information is easier to recall than standard text-based learning materials? Why?
10. Which words do you still remember from the mini-lesson you saw about the best personal traits for employment?
11. Why do you think you remember those words exactly?

Data Analysis

After all the data has been collected, coded, and collapsed for themes using MaxQDA, it is then organized and categorized based on those themes created. For interviews, I used MaxQDA to generate themes after I create codes for the transcripts. The online Questionnaire,

which is on SurveyMonkey software, automatically generates reports and charts based on the responses gathered. The last data collection method is the physical artifacts. For this method, I made a cross-case synthesis (Creswell & Poth, 2018) between the learners' pre-course and post-course artifacts for speaking and writing activities, grades, and differences in the learner's CLB level.

I then used all the codes created from the three data collection methods and put them in significant categories to create thematic families and patterns (Saldaña, 2021). I proposed a hierarchical thematic scheme based on my reasoning and understanding of the data collected (Saldaña, 2021).

Individual Interviews Data Analysis Plan

For interview data analysis, the transcripts were captured through two methods to ensure accuracy: the researcher's interview notes that are saved on a password-protected computer and the Text-to-Speech feature to transfer the audio to text on a Word Doc. Once all the transcripts were available and saved, I uploaded the files on MaxQDA software, and I manually created codes and entered them on the MaxQDA app. Saldaña (2021) pointed out that a code is usually a word or phrase representing a segment of language or visual data. The software automatically creates themes based on the codes I have made.

The rationale behind using this software is that it can store a vast amount of data, access all coded segments of the data saved, organize large files, and help retrieve those files at any time (Creswell & Poth, 2018). The authors also explained how computer software programs could help locate and sort the material, producing visual representations for themes and codes. As with any other software program, there are some disadvantages that the researcher needs to

pay attention to, such as investing the time to understand and set up the program, being hindered in creativity, and spending time to pick the right program that fits the case study.

Physical Artifacts Data Analysis Plan

The physical artifacts were collected, including information about the students' CLBs before and after joining the class and students' productive language skills artifacts in speaking and writing. I created codes and themes the same way the interview transcripts were analyzed. Furthermore, I used verbatim similarities and differences in the notes to help build patterns and create codes, as in words that have been repeated, are opposites, and share similar concepts. Both student grades and attendance were entered into Excel sheets to analyze, conclude from, and find relationships and patterns if possible. Lastly, I added codes to the data and categorize the codes to generate cognate patterns (Saldaña, 2021).

Questionnaire Data Analysis Plan

As for the questionnaire data analysis plan, I sent an 11-question questionnaire online by creating a SurveyMonkey form that provides its output on an Excel sheet. SurveyMonkey was picked for collection and first-layer analysis because it has many helpful features for the case study, like pre-existing templates, questions, and themes that I can customize; it has a Likert-like scale for questions used to gather learners' opinions and attitudes regarding a specific topic. Most importantly, SurveyMonkey simplifies the analysis process by generating charts, filters, crosstab reports, and automated summaries.

Additionally, SurveyMonkey computer software has a feature called sentiment analysis, where responses can be grouped as positive, neutral, or negative; it also provides a word cloud that features the most frequent words in a text. Lastly, all the data can be exported in PDF, PPT, XLS, or CSV format to make it easier for the researcher to review, analyze, interpret, and

categorize. Once the data is exported, the plan uses a pattern-matching method because it compares empirical patterns based on my study findings with predicted ones (Yin, 2012).

Trustworthiness

Shenton (2004) discussed how trustworthiness in qualitative studies is still questioned by many positivists since their criteria for validity and reliability are different from "real work." However, some naturalistic researchers used different terminology to separate their work from the rationalist model (Shenton, 2004). Guba, for instance, proposed four criteria of trustworthy studies that can be used in qualitative research that correspond to the criteria used by positivists (Shenton, 2004). The first one is credibility as opposed to internal validity. The second criterion is transferability as opposed to external validity; the third is dependability rather than reliability and confirmability instead of objectivity (Shenton, 2004). This study thoroughly scrutinizes these criteria, namely credibility, transferability, dependability, confirmability, and ethical consideration.

Credibility

Creswell and Poth (2018) explained that many qualitative researchers use different terms regarding validity than the ones used in quantitative research. Some of those terms would combine or synthesize different perspectives for the same idea; however, in the end, the authors summarized all the other stances when explaining validity to reach the accuracy of the study's findings. In this study, I ensured credibility through the following methods: triangulation and peer debriefing.

Shenton (2004) clarified the different approaches for triangulation that would utilize various methods for data collection and analysis. To synthesize data, I created a focus group with some colleagues to confirm the credibility of the work done and the data collected with me.

Focus groups consisted of two to three colleagues who observed, reviewed, discussed, and confirmed the credibility of the data collected.

Lincoln and Guba (1985) described “the role of the peer debriefer as a “devil’s advocate,”” an individual who keeps the researcher honest; (as cited in Creswell & Poth, 2018, p. 263). To deploy this method, a fellow researcher with professional credentials evaluated the data with me, analyzed the findings, and reviewed the outcomes to ensure that all the data was reliable and valid. I then sent all the data to my fellow researcher, requesting him to review it and validate the findings. Then, we got together and discussed any discrepancies.

Transferability

Transferability is about generalizing the results and findings to a broader population (Shenton, 2004); however, there were different viewpoints to this view in qualitative research as it is almost impossible to generalize the findings since there are no precisely similar situations and populations in two additional research studies.

On the other hand, Creswell and Poth (2018) mentioned that the researcher must use a thick description to transfer the findings of a specific study. Therefore, once participants are confirmed, a complete detailed description of the participant’s settings, background, and education will occur. The findings can be used again in similar situations upon using these criteria.

Dependability

Dependability is defined as the overlapping method that other researchers can employ. To do so, the steps in the study are reported in detail, thus allowing other researchers to repeat or follow the same procedures (Shenton, 2004). Lincoln and Guba (1985) stated that dependability means the research findings can be replicated and consistent. Therefore, to achieve this, I wrote

the steps of the study in full detail and request a peer debriefing to confirm that those findings can be used again. The dissertation committee has checked the work, and the results are deemed dependable after approval.

Confirmability

In the naturalist's view, confirmability is the equivalent of objectivity (Creswell & Poth, 2018). It refers to applying for the work while excluding the researcher's biases as much as possible. Shenton (2004) mentioned that to achieve confirmability, researchers should showcase that their findings came from the data collected and emerged from the researchers' predispositions. There are multiple methods to achieve confirmability through an auditing process and triangulation. In the current study, I employed different aspects of triangulation and an in-depth methodological description. A thick description, peer debriefing, and focus groups were utilized for the former. As for the latter, a full review of the literature has been employed.

Ethical Consideration

Ethical consideration entails protecting the participants who participate in the study; it applies to any study that involves humans (Yin, 2012). In the current research, ethical consideration is achieved through the following steps: first, consent forms are obtained from the teachers and the students participating in the study. In the consent form, I inform them about the nature of the research, its purpose, and the steps included, and I allow them to leave at any given time if needed (Creswell & Poth, 2018).

Second, I shielded participants behind pseudonyms. Lastly, I secured and archived the digital and physical data by adding all the information gathered in one place on Google Drive. The document is password-protected.

Permissions

The first step is to get approval from the IRB to move on with the study, and then I get the ABC director's approval to conduct the research there. My direct manager's approval follows that through email correspondence. Then, I need to coordinate with class instructors to find the best time for them to run those interviews. Once I receive the approval and coordinate interview times with the teachers, I send the students their recruitment email together with the consent form, and upon receiving the responses, the research study starts.

Summary

This chapter provided a detailed overview of the study's design, its steps, and the reason for using it. It also highlighted the study's data collection, analysis, and trustworthiness. Additionally, in this chapter, I shared my biases, positionality, and philosophical assumptions to offer the reader the understanding required to move to chapter four of the dissertation.

CHAPTER FOUR: FINDINGS

Overview

In this embedded single case study, the primary objective is to investigate optimal multimedia principles to incorporate into online course design catering to adult ESL learners within a community agency in Ontario, Canada. The aim is to identify strategies that could significantly augment this demographic's retention and production of newly acquired vocabulary. The deficiency of such attributes in existing online courses for this target population contributes to multiple issues, described in the previous chapters. This chapter elucidates the study's outcomes, encompassing participant profiles, themes, and subthemes derived from the collected data and comprehensive responses to the research questions. A concise summary concludes this chapter, summarizing the key insights gleaned from the investigation.

Participants

All participants are adult ESL learners who have experienced learning online in any capacity. The first survey was sent to 54 ESL learners, whose English proficiency levels range between high intermediate to advanced. Out of the 54 students, 11 completed the entire study. Participants had to follow a few steps: First, fill out the participation form. Second, watch a mini-vocabulary PowerPoint lesson and take a short quiz afterward. Third, engage in a 30-minute one-on-one interview with the researcher online, and lastly, complete a 15-minute online questionnaire sent to their email afterward.

Table 1

Name	Gender	Level of English	Educational Background	Age
1. Majeed Dawlatzi	Male	Advanced	Bachelor's degree	40-50
2. Samir Mounir	Male	Advanced	Bachelor's degree	50-60
3. Sunny Qian	Female	Intermediate	Bachelor's degree	40-50
4. Jane Lai	Female	Intermediate	Master's degree	50-60
5. Peter Hazkayal	Male	Intermediate	High school	20-30
6. Svitlana M.	Female	Intermediate	Bachelor's degree	50-60
7. Samar Mohamoud	Female	Advanced	Master's degree	30-40
8. Maria Brown	Female	Intermediate	Bachelor's degree	20-30
9. Mark Gabriel	Male	Advanced	Bachelor's degree	30-40
10. Katie Yanchynska	Female	Intermediate	Bachelor's degree	40-50
11. Mona Zainy	Female	Intermediate	Bachelor's degree	30-40

Results

The outcomes of this study not only showcase coherence but also reveal a striking uniformity in the responses gathered. By analyzing data stemming from quizzes, interviews, and questionnaires, some clear insights have emerged, forming three overarching themes, each is accompanied by one to two subordinate themes. These thematic revelations not only provide a comprehensive overview but also paint a vivid picture of the real impact that multimedia strategies wield in shaping the landscape of newly acquired vocabulary transfer, retention, and production among adult ESL students. The convergence of these findings underscores the effectiveness of incorporating multimedia elements in online and distance education courses to enhance language learning outcomes in this demographic.

Themes & Subthemes

Table 2

<p style="text-align: center;">1. Multimedia Integration for Vocabulary Transfer</p> <ul style="list-style-type: none"> • 1.1 Visual and Interactive Aids <ul style="list-style-type: none"> • Visuals • Interactive games • Practice • Repetition • 1.2 Multimodal Approach <ul style="list-style-type: none"> • Human Voice vs. Robot Voice • Small segments • Narration 	<p style="text-align: center;">2. Barriers and Solutions in Online Course Design</p> <ul style="list-style-type: none"> • 2.1 Overcoming Barriers <ul style="list-style-type: none"> • Exposure • Identifying Barriers • Distractions • 2.2 Technology-Enhanced Learning <ul style="list-style-type: none"> • Pic with text • Text Highlight • Pronunciation 	<p style="text-align: center;">3. Learners' Perceptions and Effective Multimedia Elements</p> <ul style="list-style-type: none"> • 3.1 Learners' Positive Experiences <ul style="list-style-type: none"> • Fluency • Employment
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Multimedia Integration for Vocabulary Transfer

The first theme shows the efficacy of incorporating diverse multimedia elements in online courses to enhance the vocabulary transfer, retention, and production of ESL learners.

Exploring multimedia integration, including visual and interactive aids, and adopting a multimodal approach focusing on human voices, small segments, and narration provides valuable insights into optimizing ESL learners' vocabulary transfer in online courses.

Participants' perspectives underscore the significance of these elements in creating an enriching and effective online learning environment for vocabulary development.

Visual and Interactive Aids

The first subtheme underscores the importance of visuals, interactive games, and repetitive practices in facilitating vocabulary transfer. Participants consistently emphasized the impact of visually engaging content; Zainab stated that "seeing words alongside images helped me remember them better." Interactive games were praised for making learning enjoyable and contributing to enhanced vocabulary retention: Kerols said, "Games like Kahoot! I tend to remember them more than others." Moreover, the incorporation of vocabulary repetition appeared to have a high effect on the participants; one participant noted that "repeating words in different contexts really stuck with me" and "Generally speaking, it is not hard, especially as long as there is a lot of repetition."

Additionally, practicing exercises and activities emerged as a key factor in vocabulary transfer and was highlighted by many participants. Sherif mentioned, "Practice more; use the words I hear to use them and relate the words in the same situation," another view was, "I believe practice is the most important thing to speak or write better."

Multimodal Approach

Moving on to the second subtheme, which includes "Human Voice vs. Robot Voice," "Small segments," and "Narration," participants expressed a preference for the human voice, citing its warmth and natural flow as conducive to vocabulary retention. One participant

mentioned, "Human voice is better because you can hear the different tone,"; "like the human voice; I think it is more pleasing," and "Human voice, because I believe the ears are drawn more to listen to a natural voice." On the other hand, the majority agreed that robot voice is boring and "it does not have expressions. Robot voice was reported to be "monotone, and there is no feeling in it."

Breaking down lessons into small, digestible segments emerged as an effective strategy, with participants acknowledging that it allowed for focused learning and increased understanding. Participants narrated that "You cannot concentrate for a longer time. so smaller chunks are better," and "Breaking the lesson down into small pieces is better. The bigger the video, it makes it harder to concentrate." Narration was found to be a valuable aid, as one participant remarked, "Listening to narrations helped me grasp the pronunciation better than just reading"; "definitely need voice; it is easier to remember"; and "Narration is better; by hearing it, it is more fun. You will remember it."

Barriers and Solutions in Online Course Design

This theme encompasses two subthemes: "Overcoming Barriers" and "Technology-Enhanced Learning." Participants emphasized the significance of overcoming barriers, shedding light on the importance of exposure and identifying obstacles. One participant noted that there are multiple barriers for him to memorize and use new words because he has "too many things in my mind," and this is one of the obstacles for adult learners as they have to juggle between so many life responsibilities together with them learning a new language. Another participant mentioned that one of the most important barriers for her is a small vocabulary repertoire, "I need more vocabulary to explain – this is what is stopping my fluency – I need to read more, and I need to speak in English everywhere not in my first language." All this data confirms the

importance of learning and applying more vocabulary to ESL learners to communicate effectively.

Overcoming Barriers

Participants gave great ideas and shared their perceptions on how to overcome the barriers they face in their online courses. One participant mentioned, “Sometimes, it is difficult to remember when I see words without context; it is impossible to remember.” This is a reminder for all course writers and instructional designers to implement vocabulary in its context and never add or teach isolated words or themes without providing suitable contexts for these words.

Another one mentioned that lots of colors, animation, and background music can be distracting and create the opposite result of their existence, “when the pics are too colorful is distracting because the purpose is not the pic but the word; it is easier to remember when it is used in context or the media or presentation ... do not like the background music very much.” Therefore, the saying that mentions “the less is more” is a true statement in this context to allow learners to focus on the content and not be distracted by all the animation and other factors.

Technology-Enhanced Learning

The subtheme of Technology-Enhanced Learning underscores the relevance of incorporating multimedia elements like pictures with text and text highlights to assist with knowledge transfer and retention. As one participant expressed, "The more speaking with pictures or videos will make it easier to understand. If the pic has some highlighted words or text, it is better." One other participant talked about how lacking visuals can lead to distraction and losing focus in online learning, “so videos from YouTube and practice are important because it is harder to understand for me if the teacher is just speaking and there are no visuals, and she is just reading.”

Another one highlighted the importance of highlighting important words, themes, or even phrases, as this can help her pay attention to what is important. Finally, one last point that participants brought up is about adding pronunciation in course design, as people learn a new language better when they can hear the words being pronounced in the right way and not only read them: “When I hear the right pronunciation, it helps me remember faster.”

In this way, the theme and subthemes not only respond to the research question but also highlight participants' perspectives on the practical implementation of Mayer's principles in overcoming barriers and leveraging technology-enhanced learning for ESL learners' vocabulary development in online courses.

Learners' Perceptions and Effective Multimedia Elements

Within this broader theme, the focus lies on understanding how adult ESL learners perceive and engage with multimedia components in online courses. Mayer's 12 principles of multimedia learning serve as a guiding framework, emphasizing the significance of creating positive experiences, fostering confidence, promoting fluency, improving language skills, and connecting learning content to real-world applications. Adult ESL learners' perceptions are shaped by their past and present experiences, which this study aims to explore.

By acknowledging the interplay between emotional states and cognitive processes, educators can tailor multimedia-rich environments to enhance learners' overall experience. The goal is to create a positive and confidence-building atmosphere that not only facilitates language acquisition but also establishes a meaningful connection between the content and learners' personal or professional goals.

Learners' Positive Experiences

In the realm of adult ESL learning, positive experiences play a pivotal role in shaping learners' perceptions. As Mayer's 12 principles of multimedia learning emphasize, a positive emotional state enhances cognitive processes. Confidence is a crucial factor in the language acquisition journey for adult ESL learners. One of the participants mentioned that in order for her to improve her confidence, she had to talk and interact with more people in English, "I had to pick up my language to create networking and learn skills from the teachers and peers."

Mayer's principles advocate for the importance of self-assurance in the learning process, and by incorporating multimedia elements that are learner-centred that boost learners' confidence, such as encouraging and relatable visuals, learners are more likely to actively participate and persevere in their language endeavors.

Fluency

The theme of fluency is strictly linked to improving confidence, building a new network, and finding suitable employment. One participant expressed her wish for a native-like ability and said, "I want to speak English very well." Multimedia elements have the potential to contribute significantly to language improvement for adult ESL learners. Mayer's principles emphasize the importance of relevant and meaningful content. Language improvement becomes more targeted and effective by aligning multimedia materials with learners' linguistic needs and objectives. One participant declared, "I want to improve my skills in English, and I want to understand life in Canada and use informal words."

Employment

Pursuing employment often serves as a primary motivator for adult ESL learners. Mayer's principles highlight the importance of real-world connections in multimedia design. Adult ESL

learners can derive tangible benefits by incorporating elements that bridge the gap between language learning and employability skills. One participant clarified that her main reason for learning English is employment, "The first reason is to improve my English and to find jobs as soon as possible and help my children." Another one mentioned that his target is to successfully write one of the language proficiency exam for qualification purposes and again to find employment in his field, "the main point is to meet the language requirements for a job I want to have." Thus, integrating employment-focused multimedia elements supports adult ESL learners in their quest for linguistic proficiency and professional success.

Research Question Responses

The insights shared by the student participants offer a thorough comprehension of the impact of incorporating multimedia strategies into online course design on their vocabulary retention and production. The data collected from eleven participants engaged in the study elucidates that certain multimedia principles endorsed by Mayer prove highly beneficial for knowledge retention and production in the online learning environment. It became evident that not all multimedia principles have equal significance; some proved exceptionally helpful, while others may not have the same level of importance. The subsequent sections delve into the responses addressing the research question and its associated sub-questions.

Central Research Question

How can English as a Second Language (ESL) learners transfer, retain, and produce newly learned vocabulary effectively in online courses? The study reveals valuable insights in response to the main research question concerning the effective transfer, retention, and production of newly learned vocabulary among ESL learners in online courses. Integrating

multimedia strategies into online course design is a critical factor influencing vocabulary-related outcomes for ESL learners.

The nuanced interplay between positive experiences, confidence-building, and fluency development, facilitated by targeted multimedia design, contributes significantly to the effective transfer and utilization of new vocabulary in the context of online ESL courses. Hadeer asserted, “If I am learning online, I watch a movie. Watching a video will make me learn better. However, if there are no subtitles, it will be very challenging. Images made it better for me to remember the new words I learned.”

Sub-Question One

What is the influence of Mayer’s 12 multimedia design principles on ESL learners’ productive vocabulary retention and production? Examining the influence of Mayer's 12 multimedia design principles on ESL learners' productive vocabulary retention and production reveals a clear impact on the learners’ vocabulary production skills. The qualitative data gathered from participants highlights the varied effectiveness of these principles. As Mina conveyed, "Since I am a visual learner, images, pictures, videos, and diagrams did make it easier for me to learn quicker." This sentiment aligns with the findings that highlight the significance of visual elements in enhancing the learning experience for certain individuals.

However, the broader analysis indicates that the influence of these principles is not uniform across all learners. While visual elements prove highly beneficial for some, other principles may carry varying importance. This underscores the need for a tailored approach to integrating multimedia elements and recognizing the diverse learning preferences within the ESL learner community. The qualitative responses shed light on the dynamics between Mayer's principles and the enhancement of course design in online courses.

Sub-Question Two

What are learners' perceptions of the effective multimedia elements that have enabled them to retain productive vocabulary in their online courses? In response to the third research question regarding learners' perceptions of effective multimedia elements for retaining productive vocabulary in online courses, participants highlighted several key factors. Visuals were identified as a significant aid, providing a visual context that enhanced vocabulary retention; as Zainab explained, "Pictures with text help me remember more."

The preference for a human voice over a robotic one was notable, emphasizing the importance of natural and engaging auditory elements in the learning process. Kerlos confirmed, "Human voice is better because I can relate to how he speaks." Repetition emerged as a valuable strategy, contributing to the reinforcement of newly acquired vocabulary. Participants also stressed the effectiveness of highlighting relevant text, a technique that directed attention to key linguistic elements, as Hadeer emphasized highlighting essential words in online courses.

Moreover, minimizing distractions and implementing interactive games were pivotal in vocabulary retention, as participants believed a focused learning environment facilitated memory recall. Hadeer's insightful comment, "What makes it hard, if there is no engagement – just grammatical rule – you can't never remember that" underscores the critical role of engagement in the learning process. Jane's perspective further aligned with this, emphasizing the importance of immersing oneself in fluent English conversational culture through activities like watching movies, reading books, connecting with English-speaking friends, and taking additional language courses.

Summary

This study explored the impact of multimedia elements on ESL learners' vocabulary

retention and production in online courses. Learners identified visual aids, human voice engagement, repetition, and text highlighting as pivotal components in enhancing their vocabulary recall. These findings underscore the important role of multimedia elements, guided by Mayer's principles, in shaping a conducive online learning environment for adult ESL learners for effective vocabulary production.

CHAPTER FIVE: CONCLUSION

Overview

This qualitative embedded case study, conducted at the non-profit organization ABC in Ontario, Canada, aims to identify multimedia principles facilitating the transfer, retention, and production of productive vocabulary in online ESL classes for adult learners. This study focuses on identifying multimedia features informing course design that contribute to enhanced vocabulary retention. Chapter Five elaborates on the interpretation of findings, discusses implications for policy and practice, explores theoretical and methodological implications, addresses limitations and delimitations, and provides recommendations for future research.

Discussion

Initiating the investigation by identifying a research gap in the application of suitable multimedia principles in online course design for adult ESL learners, this study framed its inquiry around the central question: "How can English as a Second Language (ESL) learners transfer, retain, and produce new learned vocabulary effectively in online courses?" Given the scarcity of research on vocabulary production in the online learning environment for adult ESL learners, the central research question aimed to bridge this gap. The research was conducted at a community organization in Ontario, Canada, offering free language and training classes for new immigrants and refugees. This section presents thematic findings from a meticulous analysis and synthesis of the gathered data. It encompasses interpretations of these thematic findings, policy and practice implications, and theoretical and empirical considerations. Additionally, the section concludes by outlining the study's limitations and offering recommendations for future research.

Summary of Thematic Findings

This segment presents an overview of the thematic findings derived from collecting and

analyzing data and developing themes. The summary captures the three themes expounded upon in Chapter Four. In the subsequent discussion, I offer my interpretation of the findings, establishing connections between the outcomes and existing theoretical and empirical literature. This effort aims to contribute to a more profound comprehension of the elements that impact vocabulary retention and production within the online ESL learning environment.

Interpretation of Findings

This research effectively delved into the elements that affect vocabulary retention and production within the online ESL learning environment while also highlighting learners' perspectives on the significance of impactful multimedia elements in shaping positive learning experiences. The collected data identified three overarching themes, each accompanied by several subthemes, ultimately leading to the development of three distinct interpretations.

Enhanced Vocabulary Transfer through Visual Engagement

The thematic findings suggest that incorporating visual and interactive aids, such as visuals, interactive games, and practice sessions, contributes to effective vocabulary transfer in online ESL courses. Additionally, using a multimodal approach, including using human voice for narration and breaking down courses and lessons into small segments, further enhances the assimilation of new vocabulary among learners.

The statistical breakdown, as shown in Figure 1 below that is a copy of the codebook, reveals significant insights into the effectiveness of visual engagement for enhanced vocabulary transfer in online ESL courses. Narration emerged as the most prominent element, accounting for 13.85% of the segments. This suggests that auditory support plays a crucial role in vocabulary transfer, providing learners with a verbal context that aids in retention.

Repetition, comprising 12.31% of the segments, indicates a strategic emphasis on

reinforcing vocabulary through repeated exposure. This aligns with cognitive theories emphasizing the importance of repetition in memory consolidation, emphasizing its relevance in online ESL learning environments.

Visuals, at 10.77%, underscore the significance of incorporating visual aids to complement textual information. Visual elements anchor learners, facilitating a deeper understanding and retention of vocabulary. The prominence of visuals aligns with the principles of multimedia learning, emphasizing the effectiveness of combining visual and verbal information.

The human voice, constituting 9.23% of the segments, highlights the value of auditory cues in vocabulary transfer. The preference for a human voice over a robotic one suggests that the natural and expressive qualities of human speech contribute to a more engaging and authentic learning experience.

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. Educators and course designers can leverage these insights to tailor online ESL courses, strategically incorporating visual and auditory elements to optimize vocabulary transfer and enhance the overall learning experience for adult learners.

Figure 1:*Top-Level Code Statistics*

	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: A Copy of the Codebook from MaxQDA

Overcoming Barriers and Distractions in Online Learning

As shown in Figure 2 below, which is a copy of the MaxQDA codebook, the frequent use of the term "barriers" and "text highlight" in the 11 interviews conducted highlights the significance of these elements within the thematic focus of overcoming barriers and distractions in online learning. The repetition of the term "barriers" indicates a shared emphasis among participants on recognizing and addressing impediments in the online learning environment. Through exposure and active identification of these barriers, learners demonstrate a proactive approach to navigating challenges; as Mina explained, "Barriers could be lack of vocabulary, grammar, pronunciation, accent and limited exposure to the English culture."

Furthermore, the substantial mention (14 times) of "text highlight" underscores its pivotal role in the strategies employed by learners to overcome barriers. The repetition suggests that learners perceive text highlighting as a particularly effective multimedia tool. This could be attributed to its ability to draw attention to relevant information, aiding in comprehension and memory retention. The consistent use of this term across interviews reflects a consensus among participants regarding the importance of visual emphasis through text highlighting in mitigating distractions and enhancing the learning experience.

Overall, the data indicates a collective recognition among learners that proactive measures, such as exposure, identifying barriers, and leveraging technology-enhanced tools like text highlighting, contribute significantly to overcoming challenges in the online learning environment. These findings offer valuable insights into the practical strategies that learners find effective in addressing barriers and eliminating distractions, contributing to enhancing online course design.

Figure 2

Word Frequencies

	A	B	C	D	E	F	G
1	Word	Word length	Frequency	%	Rank	Documents	Documents %
13	ask	3	3	0.10	170	3	30.00
14	back	4	3	0.10	170	2	20.00
15	background	10	13	0.42	58	10	100.00
16	barrier	7	14	0.45	53	10	100.00
17	highlight	9	14	0.45	53	10	100.00

Figure 2: A Copy of the Codebook from MaxQDA

Fostering Positive Learning Experiences

In this study, the thematic findings highlight the significance of learners' positive experiences in shaping effective multimedia elements for vocabulary retention in online ESL courses. Learners' perceptions indicate that fostering positive learning experiences is crucial for building confidence, promoting fluency, improving language skills, and addressing employment-related aspects.

Some coded segments from the interviews highlighted the above interpretation, as shown in Figure 3 that is a copy of the codebook. One participant, Fabiola, expressed her motivation to improve her English and find jobs as soon as possible to support her children. This quote emphasizes the practical aspect of language learning, where learners recognize the connection between language skills and their career prospects. This highlights the importance of designing

online ESL courses that incorporate relevant vocabulary and real-world applications to address learners' employment needs.

Another participant, Jane, mentioned the importance of language proficiency for networking and learning from teachers and peers. This quote emphasizes the social aspect of language learning, where learners recognize the value of effective communication in building connections and acquiring new knowledge. Incorporating interactive elements, such as group discussions or collaborative projects, can enhance the social dimension of online ESL courses and create positive learning experiences.

Sherif expressed his motivation to improve his English, indicating a general desire to enhance his language skills. This quote reflects the intrinsic motivation of learners to develop their language abilities, which should be nurtured and supported in online ESL courses. Providing engaging and interactive activities tailored to the learners' proficiency level can help maintain their motivation and create positive learning experiences.

Mina's statement highlights the specific goal of improving vocabulary. Learners recognize the importance of a strong vocabulary for effective communication. In online ESL courses, incorporating multimedia elements that reinforce vocabulary acquisition, such as visuals and repetition, can enhance learners' engagement and retention.

Lastly, Kerlos mentioned the requirement of an English test for university admissions in Ontario. This quote emphasizes the academic aspect of language learning, where learners are motivated by specific goals or requirements. Designing online ESL courses that align with standardized tests and academic expectations can provide learners with the necessary preparation and support to meet their goals.

Overall, learners' positive experiences are pivotal in effective vocabulary retention in online ESL courses. Designing courses that address learners' practical, social, intrinsic, and academic motivations can foster positive learning environments. Incorporating multimedia elements, such as visuals, repetition, interactive activities, and relevant contexts, can enhance learners' engagement, confidence, and fluency. Educators can create online ESL courses that provide learners with a positive and effective learning experience by taking a holistic approach to course design.

Figure 3

Coded Segments from Participants

A	B	C	D
Document	Coded Segments	Codes	Sentiment
Fabiola- Individual Interview Questions, Pos. 6	The first reason is to improve my English and to find jobs as soon as possible and help my children.	Sentiment > Slightly Positive	
Interview Questions- Jane, Pos. 6	I had to pick up my language to create networking and learn skills from the teachers and peers	Sentiment > Slightly Positive	
Sherif- Interview Questions , Pos. 5	To improve my English	Sentiment > Positive	
Interview Questions- Mina, Pos. 5	To improve my vocabulary.	Sentiment > Positive	
Interview Questions- Kerlos, Pos. 5	Because I am preparing for an English test bec it is a requirement to join universities in ON	Sentiment > Slightly Positive	

Figure 3: A Copy of the Codebook from MaxQDA

Implications for Policy or Practice

The implications drawn from this study's thematic findings offer valuable insights for policymakers, administrators, teachers, course designers, and students alike. By synthesizing learners' perceptions and highlighting the pivotal role of positive learning experiences in shaping effective multimedia elements for vocabulary retention, this study lays the groundwork for actionable recommendations to enhance the online ESL learning environment. Policymakers can

advocate for policies that prioritize holistic approaches to language education, addressing both linguistic proficiency and learners' broader needs, such as employment prospects.

Administrators can leverage these insights to inform the design and implementation of online ESL programs, fostering a supportive and engaging learning environment. Teachers are encouraged to adopt pedagogical strategies that promote confidence-building, fluency development, and vocabulary improvement, aligning with students' aspirations and motivations. Additionally, course designers are tasked with integrating multimedia elements that cater to diverse learning styles and enhance vocabulary retention. Lastly, students are empowered to engage actively in their language learning journey, recognizing the value of positive experiences in achieving their language goals. By following these recommendations, stakeholders can collectively contribute to the advancement of online ESL education, fostering an inclusive and effective learning environment for adult learners.

Implications for Policy

This study's findings hold significant implications for policymakers, offering actionable insights to enhance online learning for adult ESL learners. One specific recommendation for policymakers is to mandate the adoption of a specialized Learning Management System (LMS) platform across all program providers delivering online ESL courses. By implementing a standardized LMS platform, policymakers can ensure consistency and quality across online training programs. This platform could be tailored to incorporate multimedia elements identified in the study, such as visual aids, interactive games, and narration, to optimize vocabulary retention and facilitate positive learning experiences for adult ESL learners. Mandating the use of a specialized LMS platform would also streamline administrative processes, enable data

collection for program evaluation, and enhance accessibility for learners across diverse demographics.

Furthermore, policymakers can leverage this study to advocate for funding and support mechanisms to facilitate the implementation of specialized LMS platforms and multimedia-rich course content. Investing in technology infrastructure and training initiatives for teachers and administrators will be crucial in effectively implementing these recommendations. Additionally, policymakers can collaborate with educational institutions, non-profit organizations, and industry stakeholders to develop guidelines and standards for online ESL course design and delivery. These guidelines can encompass best practices identified in the study, ensuring that online courses meet quality benchmarks and align with learners' needs and aspirations. These initiatives have the potential to enhance language acquisition outcomes, promote workforce integration, and empower individuals to achieve their personal and professional goals through online ESL education.

Implications for Practice

For administrators, the findings of this study suggest the importance of prioritizing a holistic approach to online ESL program design. Administrators may consider allocating resources toward developing comprehensive support services that address not only language acquisition but also learners' broader needs, such as employment readiness and social integration. Additionally, administrators may be encouraged to foster collaboration among different departments within the organization to ensure that resources are effectively utilized and aligned with the program's overarching goals. By adopting a holistic approach and fostering interdepartmental collaboration, administrators can create a more supportive and enriching learning environment for adult ESL learners.

Teachers can leverage the insights from this study to refine their instructional practices and better support the language learning needs of their students. Specifically, teachers may explore pedagogical strategies that prioritize building learners' confidence and fluency while also promoting vocabulary retention. For example, teachers may incorporate interactive activities, such as role-playing exercises or group discussions, to provide opportunities for students to practice using newly acquired vocabulary in context. Furthermore, teachers may also be encouraged to provide regular feedback and encouragement to students, recognizing their progress and reinforcing positive learning experiences. By implementing these strategies, teachers can create a dynamic and engaging classroom environment that fosters language development and empowers students to achieve their language learning goals.

Course designers play a crucial role in shaping the online learning experience for adult ESL learners. Building on the findings of this study, course designers may consider integrating multimedia elements that cater to diverse learning styles and enhance vocabulary retention and production. For instance, course designers may explore the use of different visual aids, interactive games, and scaffolding activities in order to present the content in smaller chunks, not to overwhelm the learners' working memory, and human-based narrations designed to create engaging and interactive course content. Additionally, course designers may also be encouraged to provide flexible learning pathways, which are personalized learning techniques that allow students to progress at their own pace and focus on areas of interest or need. By designing engaging, interactive, and adaptable courses, course designers can create an effective and inclusive learning experience for adult ESL learners.

Lastly, students themselves can take an active role in their language learning journey by leveraging the insights from this study. Students may explore additional resources and

opportunities for language practice outside of the classroom, such as language exchange programs, online language learning platforms, or community events. Additionally, students may also be encouraged to actively engage with course materials and seek clarification or assistance when needed. By taking ownership of their learning and actively seeking opportunities for practice and support, students can enhance their language skills and progress towards their language learning goals.

Empirical and Theoretical Implications

In the realm of academic research, understanding and analyzing the implications of a study's findings is essential for advancing knowledge within a particular field. This section delves into the empirical and theoretical implications of the study, aiming to bridge the gap between observed phenomena and existing theoretical frameworks outlined in Chapter Two. By comparing and contrasting the identified themes with the theories and literature supporting the study, we can discern how the empirical evidence aligns, contradicts, or extends the theoretical underpinnings.

Empirical Implications

It is apparent that some the study's findings intersect with the theories mentioned in Chapter Two. Firstly, the study's findings demonstrate a strong alignment with Mayer's CTML (Mayer, 1997), particularly regarding the effectiveness of multimedia presentations in enhancing learning outcomes. For instance, the empirical data revealed that learners exposed to multimedia instructional materials, incorporating both visual and auditory elements, exhibit higher levels of comprehension and retention compared to those exposed to traditional text-based materials alone. This empirical evidence corroborates Mayer's assertion that incorporating multiple modalities facilitates cognitive processing and improves learning outcomes.

However, the study also uncovered instances where certain types of multimedia presentations did not yield the expected learning benefits. For example, if the multimedia content is overly complex or visually distracting, it may overload learners' cognitive capacities, thus contradicting the principles of CTML (Mayer, 1997). Also, it did not yield any difference in retention or production if the presenter had his/her photo on the presentation. Such discrepancies highlight the nuanced application of Mayer's theory and the importance of considering contextual factors in multimedia design.

Secondly, more empirical findings aligned with Sweller's CLT by revealing the importance of managing cognitive load in instructional design (Sweller, 2010). For instance, my study showed that reducing extraneous cognitive load, such as irrelevant visual stimuli, very colorful material, or excessive text, enhances learning outcomes. This empirical support reinforces Sweller's emphasis on minimizing cognitive overload to optimize learning efficiency.

Thirdly, the empirical evidence confirmed Paivio's DCT by demonstrating the beneficial effects of dual coding on learning and memory (Paivio, 2013). For instance, the study found that presenting information through both verbal and visual channels enhances encoding and retrieval processes, leading to improved learning outcomes; participants expressed better results when narration is accompanied by visual aids. This empirical support underscores the utility of DCT in guiding instructional design practices that leverage dual coding strategies.

Conversely, the study also uncovered instances where dual coding does not significantly impact learning outcomes, particularly in contexts where learners' cognitive preferences or prior knowledge play a significant role (Paivio, 2013). For example, when learners demonstrate strong verbal processing abilities but struggle with visual processing, the benefits of dual coding may be reduced. Such findings suggest the need for personalized instructional approaches.

Theoretical Implications

In examining how the findings of this study align with the theoretical frameworks outlined in Chapter Two, it becomes evident that several theories offer varying perspectives on this study. Multiple theories inspired this study, yet it is based on Mayer's CTML. This theory posits that learning is most effective when information is presented in a manner that aligns with how the human brain processes and organizes information. It emphasizes principles such as coherence, signaling, and multimedia redundancy. This study's findings may align with CTML by demonstrating how specific multimedia elements, such as visual aids or interactive components, enhance language learning outcomes. For instance, since my research shows that learners exposed to multimedia materials exhibit better retention and comprehension of language concepts than those exposed to text-only materials, this should support CTML principles.

Moving to the next key theory cited in this study, CLT focuses on the cognitive load imposed on learners during the learning process, suggesting that instructional design should minimize extraneous cognitive load and optimize intrinsic cognitive load. This study may align with CLT by revealing how specific instructional formats or materials alleviate or exacerbate cognitive load in language learning contexts. For example, when participants described how too much text, music in the background, or colorful materials hinder their concentration and ability to retain the new vocabulary learned due to excessive cognitive load, this would corroborate CLT principles.

DCT is the second fundamental theory that CTML is built on. It proposes that information is processed through two distinct channels - verbal and nonverbal - and that dual coding enhances learning by engaging both channels simultaneously. Findings from the study may align with DCT by illustrating how the integration of verbal and visual elements in

multimedia language learning materials enhances comprehension and retention. Participants confirmed that being exposed to multimedia materials incorporating both text and images demonstrates superior language proficiency compared to those exposed to text-only materials; this would support DCT.

Andragogy, Second Language Acquisition (SLA), Constructivism, and Schema Theory offer additional perspectives on adult learning, language acquisition, knowledge construction, and cognitive organization. The study may align with these theories by exploring how adult learners engage with multimedia language learning resources, construct meaning from diverse sources, and integrate new language knowledge into existing cognitive schemas. Contrasts may arise if the study's findings challenge assumptions or predictions derived from these theories, prompting scholars to reconsider or refine existing conceptual frameworks.

By analyzing how the study's themes intersect with the aforementioned theoretical frameworks, researchers can gain insights into the underlying mechanisms driving language learning processes and instructional design practices. Additionally, identifying areas of alignment and contrast helps refine theoretical models and inform future research endeavours aimed at optimizing language learning outcomes in multimedia-rich environments.

Limitations and Delimitations

In this section, the constraints and shortcomings encountered during the course of the research will be addressed. By acknowledging these limitations upfront, some areas where the study may have been constrained in terms of methodology, data collection, sample size, or other relevant factors. Understanding these limitations is crucial for contextualizing the scope and generalizability of the study's conclusions.

Limitations

The primary limitation of this study relates to the sample size and diversity of participants. Due to time and resource constraints, the study may have included a relatively small and homogenous sample, potentially limiting the generalizability of the findings across broader populations. Moreover, despite efforts to recruit diverse participants, there may be inherent biases in the sample composition, such as underrepresentation of certain demographic groups or overrepresentation of specific backgrounds. In this study, out of the 11 participants, four are Egyptians, two are Ukraine, and five are Chinese.

Another limitation pertains to geographical constraints, particularly in terms of data collection and participant recruitment. The study may have been limited to specific geographical regions or settings, which could impact the applicability of the findings to other contexts. The study has only included 11 adult ESL participants from east Ontario. Additionally, logistical challenges related to geographical dispersion may have hindered the inclusion of a more diverse and representative sample.

Participant refusal and attrition present significant challenges in many research studies and are potential limitations of this study. Despite diligent efforts to engage participants and maintain their involvement throughout the study, factors such as time constraints, lack of interest, or personal reasons may have led to participant refusal or dropout, thereby affecting the completeness and representativeness of the data. The study 52 participants started the first phase of the study, which is the participation consent; by the second part, where they needed to watch a whole lesson and engage in some quizzes, this number was reduced to 23. However, only 11 have shown up for the interviews.

Delimitations:

In this study, several deliberate delimitations were implemented to define and refine the scope of the research. These decisions ensured clarity, focus, and relevance to the research objectives. One of the key delimitations was the establishment of an age criterion for participants, limiting the study to individuals aged 18 and above. This decision was motivated by the need to target an adult population, as they possess a certain level of maturity and cognitive ability necessary for meaningful participation and comprehension of the research objectives. By excluding participants under 18, the study aimed to maintain consistency and coherence in data collection and analysis.

Another significant delimitation pertained to the proficiency level of the English language among participants. The study specifically targeted individuals with intermediate or above proficiency in English. This criterion was essential to ensure effective communication and comprehension during data collection and analysis. By focusing on participants with a certain level of English proficiency, the study aimed to mitigate potential language barriers that could impede the quality and reliability of the data obtained.

Additionally, the study delimited the participant pool to individuals with prior experience in online learning environments. This criterion was selected to target a specific population subset that could provide valuable insights and perspectives on the research topic. By focusing on individuals with experience in online learning, the study aimed to gather relevant and meaningful data that aligned with the research objectives and facilitated a comprehensive understanding of the study goals.

Recommendations for Future Research

In light of the findings, limitations, and delimitations of the study, several recommendations can be made for future research endeavors in the field of adult ESL learning. Firstly, considering the geographical limitations of the current study, future research should aim to broaden the scope by including participants from diverse geographical areas, encompassing various university and school board settings. This broader sampling strategy would enable researchers to capture a more comprehensive understanding of the nuances and challenges faced by adult ESL learners across different educational contexts.

Moreover, future research should prioritize exploring the experiences of adult ESL learners from more diverse backgrounds, including those with varying cultural, linguistic, and socioeconomic backgrounds. By incorporating a more heterogeneous participant pool, researchers can uncover unique insights into the intersectionality of factors influencing ESL learning outcomes and inform more inclusive and culturally responsive pedagogical approaches.

Additionally, future studies could employ mixed-methods research designs to complement quantitative data with qualitative insights, providing a more holistic understanding of the complex dynamics at play in adult ESL learning. Qualitative approaches such as interviews, focus groups, and ethnographic observations can offer rich contextual information that enhances the interpretation and generalizability of quantitative findings.

In summary, future research in the field of adult ESL learning should strive to expand the geographical and demographic scope of participants, adopt mixed-methods research designs, and explore innovative pedagogical approaches to address the diverse needs of adult ESL learners. These recommendations aim to advance scholarly understanding, promote inclusive practices, and ultimately contribute to the enhancement of ESL education programs worldwide.

Conclusion

This research underscores the pivotal connection between vocabulary acquisition and communication skills, emphasizing the critical importance of productive skills retention, production, and application among learners of all ages. By exploring multimedia principles in online education, this study illuminates promising avenues for enhancing vocabulary retention and production in adult ESL learners. The findings highlight the efficacy of integrating multimedia elements, such as visual aids, interactive exercises, and audio-visual materials, into online learning environments to facilitate meaningful engagement, comprehension, and retention of vocabulary knowledge.

One of the key takeaways from this research is the significance of adopting multimedia principles in online education to support vocabulary acquisition and communication skills development. By leveraging multimedia tools and techniques, educators can create dynamic and immersive learning experiences that cater to diverse learning styles and preferences, ultimately enhancing learner engagement and effectiveness. Additionally, the study underscores the importance of considering the interplay between technology, pedagogy, and learner characteristics in designing and implementing online educational interventions tailored to the needs of adult ESL learners.

Overall, this research contributes valuable insights to the field of language education by elucidating the potential of multimedia-enhanced online learning approaches to foster vocabulary retention and production among adult ESL learners. Moving forward, it is imperative for educators, curriculum developers, and policymakers to integrate evidence-based multimedia principles into online language instruction, thereby empowering adult ESL learners to achieve their language learning goals and effectively communicate in diverse contexts.

References

- Albert, S., Takouda, P. M., Robichaud, Y., & Haq, R. (2013). Building a self-directed process for developing internationally trained professional profiles in Canada. *Journal of International Migration and Integration*, 14, 671-688.
- Andrade, M. S. (2017). Online English language learning: Theory-based course design and pedagogy. *Journal of Education and Training Studies*, 5(3), 1–10. Retrieved from <https://search-ebshost-com.ezproxy.liberty.edu/login.aspx?direct=true&db=eric&AN=EJ1133210&site=ehost-live&scope=site>
- Arghode, V., Brieger, E. W., & McLean, G. N. (2017). Adult learning theories: implications for online instruction. *European Journal of Training and Development*.
- Babić, I. Đ. (2017). Machine learning methods in predicting the student academic motivation. *Croatian Operational Research Review*, 8(2), 443–461.
doi:<http://dx.doi.org.ezproxy.liberty.edu/10.17535/corr.2017.0028>
- Bartlett, F. C. (1932). *Remembering*. Cambridge: Cambridge University Press.
- Carolan, T. F., Hutchins, S. D., Wickens, C. D., & Cumming, J. M. (2014). Costs and benefits of more learner freedom: Meta-analyses of exploratory and learner control training methods. *Human Factors*, 56(5), 999–1014.
- Carter, C. S., Solberg, L. B., & Solberg, L. M. (2017). We are applying theories of adult learning in developing online programs in gerontology. *Journal of adult and continuing education*, 23(2), 197-205.

Castro-Alonso, J. C., de Koning, B. B., Fiorella, L., & Paas, F. (2021). Five strategies for optimizing instructional materials: Instructor-and learner-managed cognitive load. *Educational Psychology Review*, 33(4), 1379–1407.

Castro-Alonso, J. C., Wong, R. M., Adesope, O. O., & Paas, F. (2021). Effectiveness of multimedia pedagogical agents predicted by diverse theories: A meta-analysis. *Educational Psychology Review*, 33(3), 989-1015.

Centre for Canadian Language Benchmarks. (n.d.). Retrieved December 3, 2022, from <https://www.language.ca/home/>

Chen, C. Y., Pedersen, S., & Murphy, K. L. (2011). Learners' perceived information overload in online learning via computer-mediated communication. *Research in Learning Technology*, 19(2).

Chin Lee Lee, M., Krishnamoorthy, K., & Rong, Y. J. (2019). The role of negotiated interaction in L2 vocabulary acquisition among primary ESL. *3L, Language, Linguistics, Literature*, 25(2), 1-21. <https://doi.org/10.17576/3L-2019-2502-01>

Choi, Y., & Lee, H. (2022). Psychometric properties for multidimensional cognitive load scale in an E-learning environment. *International Journal of Environmental Research and Public Health*, 19(10), 5822. <https://doi.org/10.3390/ijerph19105822>

Chukwuedo, S. O., Mbagwu, F. O., & Ogbuanya, T. C. (2021). Motivating academic engagement and lifelong learning among vocational and adult education students via self-

direction in learning. *Learning and Motivation*, 74,
101729. <https://doi.org/10.1016/j.lmot.2021.101729>

Coady, J. (1997). 14 L2 vocabulary acquisition A synthesis of the research. *Second language vocabulary acquisition: A rationale for pedagogy*, p. 273.

Coady, J., & Huckin, T. (1997). (Eds). *Second Language Vocabulary Acquisition*. NY: Cambridge University Press.

Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches*. Sage publications.

Cuevas, J. (2016). An analysis of current evidence supporting two alternate learning models: learning styles and dual coding. *Journal of Educational Sciences & Psychology*, 6(1), 1–13.

Cuevas, J., & Dawson, B. L. (2018). A Test of two alternative cognitive processing models: learning styles and dual coding. *Theory and Research in Education*, 16(1), 40–64.

Davis, J. N. (1989). Facilitating effects of marginal glosses on foreign language reading. *The Modern Language Journal*, pp. 73, 41–48.

De Paepe, L., Zhu, C., & Depryck, K. (2019). Developing and implementing online Dutch L2 courses in adult education: educators' and providers' perceptions of constraints and critical success factors. *Innovation in language learning and teaching*, 13(3), 277-291

Dias, S. B., Hadjileontiadou, S. J., Diniz, J., & Hadjileontiadis, L. J. (2020). Deep LMS: A deep learning predictive model for supporting online learning in the COVID-19 era. *Scientific Reports*, 10(1), 19888-19888. <https://doi.org/10.1038/s41598-020-76740-9>

Dirksen, J. (2016). *Design for how people learn*. Berkeley, CA: New Riders.

- Doughty, C., & Williams, J. (Eds.). (1998). Focus on form in classroom second language acquisition. Cambridge: Cambridge University Press.
- Garcia, K. R., Rodrigues, L., Pereira, L., Busse, G., Irbe, M., Almada, M., Christensen, C., Midão, L., Dias, I., Heery, D., Hardy, R., Quarta, B., Poulain, M. M., Bertram, M., Karnikowski, M., & Costa, E. (2021). Improving the digital skills of older adults in a COVID-19 pandemic environment. *Educational Gerontology, 47*(5), 196-206. <https://doi.org/10.1080/03601277.2021.1905216>
- Gass, S. (1987). (Ed). The use and acquisition of the second language lexicon. *Studies in Second Language Acquisition 9*(2).
- Hartland, W., Biddle, C., & Fallacaro, M. (2008). Audiovisual facilitation of clinical knowledge: a paradigm for dispersed student education based on Paivio's Dual Coding Theory. *AANA journal, 76*(3).
- HARTs overview*. (n.d.). Centre for Education & Training | Employment & Career Services | Settlement & Language Services | Education & Training Services | Youth Programs. https://www.tcet.com/index.php?option=com_content&view=article&id=123&Itemid=411
- 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>
- Homayouni, M. (2022). Peer assessment in group-oriented classroom contexts: The effectiveness of peer assessment coupled with scaffolding and group work on speaking skills and

vocabulary learning. *Language Testing in Asia*, 12(1), 61-

23. <https://doi.org/10.1186/s40468-022-00211-3>

Ipek, I., & Ziatdinov, R. (2018). New approaches and trends in the philosophy of educational technology for learning and teaching environments. *arXiv preprint arXiv:1808.06063*.

Ippolito, J. (2021). English language ability and discursive agency: The case of Canadian adult English language learners on Facebook. *Critical Inquiry in Language Studies*, 18(3), 247–272. <https://doi.org/10.1080/15427587.2020.1863798>

Kara, M., Erdogdu, F., Kokoc, M., & Cagiltay, K. (2019). Challenges faced by adult learners in online distance education: A literature review. *Open Praxis*, 11(1), 5-22. <https://doi.org/10.5944/openpraxis.11.1.929>

Kim, Y. (2008). The role of task-induced involvement and learner proficiency in L2 vocabulary acquisition. *Language Learning*, 58(2), 285–325. <https://doi.org/10.1111/j.1467-9922.2008.00442.x>

Knowles, M. S. (1978). Andragogy: Adult learning theory in perspective. *Community College Review*, 5(3), 9–20.

Kolesnikova, I. A. (2020). Innovative changes in the education of the 2010s: pro and cons. *International Dialogues on Education: Past and Present*, 7(1), 91–112.

Krahnke, K. J. (1983). Principles and practice in second language acquisition. *TESOL Quarterly*, 17(2), 300-305. <https://doi.org/10.2307/3586656>

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.

- Li, J. (2021). Design, implementation, and evaluation of online English learning platforms. *Wireless Communications and Mobile Computing, 2021*.
- Lightbown, P. M., & Spada, N. (2013). *How languages are learned fourth edition-Oxford Handbooks for Language Teachers*. Oxford University Press.
- Lincoln, Y., & Guba, E. (1985). *Naturalistic inquiry*. Sage.
- Loeng, S. (2017). Alexander Kapp—the first known user of the andragogy concept. *International Journal of Lifelong Education, 36*(6), 629–643.
- Long, M. H., & Robinson, P. (1998). Focus on form: Theory, research and practice. In Doughty, C. J., & Williams, J. (eds.), *Focus on form in second language acquisition* (pp. 15-41). Cambridge: Cambridge University Press.
- Machynska, N., & Boiko, H. (2020). andragogy – the science of adult education: Theoretical aspects. *Journal of Innovation in Psychology, Education and Didactics, 24*(1), 25-34.
- Mayer, R. (2014). Cognitive Theory of Multimedia Learning. In R. Mayer (Ed.), *The Cambridge Handbook of Multimedia Learning* (Cambridge Handbooks in Psychology, pp. 43–71). Cambridge: Cambridge University Press. doi:10.1017/CBO9781139547369.005
- Mayer, R. E. (1997). Multimedia learning: Are we asking the right questions? *Educational psychologist*, pp. 32, 10–19.
- McVee, M. B., Dunsmore, K., & Gavelek, J. R. (2005). Schema theory revisited. *Review of Educational Research, 75*(4), 531–566. <https://doi.org/10.3102/00346543075004531>

Md Yunus, M., Ang, W. S., & Hashim, H. (2021). Factors affecting teaching English as a second language (TESL) postgraduate students' behavioural intention for online learning during the COVID-19 pandemic. *Sustainability (Basel, Switzerland)*, 13(6), 3524.

<https://doi.org/10.3390/su13063524>

Nassaji, H. (2002). Schema theory and knowledge-based processes in second language reading comprehension: A need for alternative perspectives. *Language learning*, 52(2), 439-481.

Nation, P. (1993). Vocabulary size, growth, and use. In R. Schreuder and B. WESLans (eds) *The Bilingual Lexicon* (pp. 115-134). John Benjamins, Amsterdam/Philadelphia.

Nation, P. (2001). *Learning vocabulary in another language*. 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>

Ortega, L. (2014). *Understanding second language acquisition*. Routledge.

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>

Pankin, J. (2013). *Schema theory*. *Massachusetts Institute of Technology*.

Park, J., & Choi, H. J. (2009). Factors influencing adult learners' decision to drop out or persist in online learning. *Educational Technology & Society*, 12(4), 207–217.

- Parkay, F. W., Anctil, E. J., & Hass, G. (2019). *Curriculum leadership: Readings for developing quality educational programs* (Custom 10th ed.). Allyn & Bacon.
- Parrish, C. W., Guffey, S. K., Williams, D. S., Estis, J. M., & Lewis, D. (2021). Fostering Cognitive Presence, Social Presence and Teaching Presence with Integrated Online—Team-Based Learning. *TechTrends*, 65(4), 473-484.
- Pope, E. M. (2020). “This Is a Head, Hearts, and Hands Enterprise”: Adult learning in interfaith dialogue. *Adult Education Quarterly*, 70(3), 205–222.
- Raw, S. D. M., & Ismail, H. H. (2021). Tracing Effectiveness and Challenges in Using Online Tools to Enhance Vocabulary Language Learning: A Review. *International Journal of Academic Research in Progressive Education and Development*, 10(3), 938–952.
- Read, J. (2004). Research in teaching vocabulary. *Annual Review of Applied Linguistics*, 24(1), 146-161.
- 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), 1–10.
- Sailsman, S. (2020). ESL students learning online: A review of literature. *Quarterly Review of Distance Education*, 21(1), 45–52.
- Saldaña, J. (2021). *The coding manual for qualitative researchers* (4th ed.). Thousand Oaks, CA: Sage Publishing Inc.

Scarpin, J. E., Mondini, V. E. D., & Scarpin, M. R. S. (2018). Technology acceptance factors and student retention in online courses. *The e-Journal of Business Education & Scholarship of Teaching*, 12(3), 44-68. Retrieved from

<http://ezproxy.liberty.edu/login?url=https://search-proquest-com.ezproxy.liberty.edu/docview/2173455496?accountid=12085>

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.

Şendurur, E., Doğusoy, B., & Yondemir Çalışkan, N. (2020). Investigation of non-native learners' informal learning processes from cognitive-load theory perspective. *Interactive Learning Environments*, 28(1), 95-106. <https://doi.org/10.1080/10494820.2018.1517096>

Shail, M. S. (2019). Using Micro-learning on mobile applications to increase knowledge retention and work performance: A literature review. *Cureus*, 11(8), e5307.

Shearer, C. B. (2020). A resting state functional connectivity analysis of human intelligence: Broad theoretical and practical implications for multiple intelligences theory. *Psychology & Neuroscience*, 13(2), 127–148. <https://doi.org/10.1037/pne0000200>

Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for information*, 22(2), 63-75.

Sternberg, R. J. (1999). The theory of successful intelligence. *Review of General Psychology*, 3(4), 292-316. <https://doi.org/10.1037/1089-2680.3.4.292>

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>

Szulewski, A., Howes, D., van Merriënboer, J. J., & Sweller, J. (2020). From theory to practice: The application of cognitive load theory to medicine. *Academic Medicine*, *96*(1), 24-30.

Tymchuk, L., Grytsyk, N., Yahupov, V., Syvokhop, Y., Hrinchenko, T., & Svystun, V. (2021).

Andragogy: Theory and practice of adult education development in Ukraine. *Revista*

Românească Pentru Educație Multidimensională, *13*(2), 185-

205. <https://doi.org/10.18662/rrem/13.2/417>

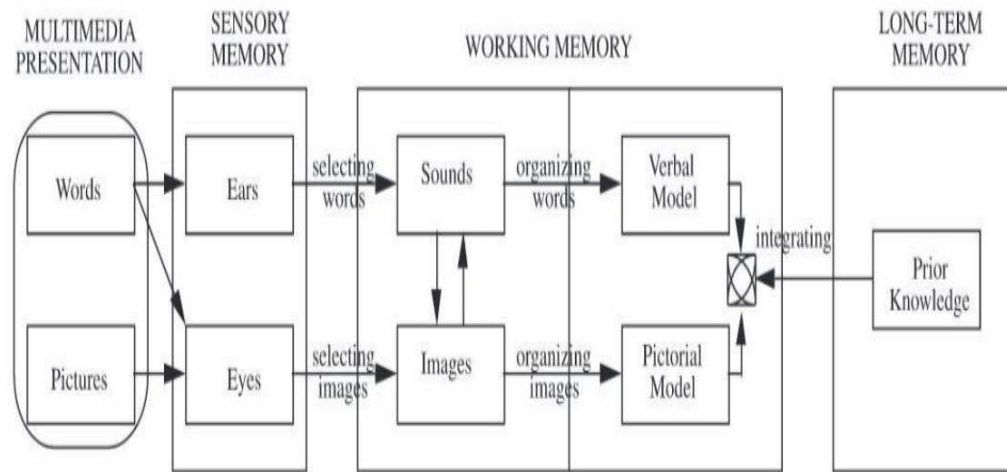
Valcke, M. (2002). Cognitive load: updating the theory? *Learning and Instruction*, *12*(1), 147–154.

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>

Wang, Z., Hwang, G., Yin, Z., & Ma, Y. (2020). A contribution-oriented self-directed mobile learning ecology approach to improving EFL students' vocabulary retention and second language motivation. *Educational Technology & Society*, *23*(1), 16-29.

- Warner, D. O., Nolan, M., Garcia-Marcinkiewicz, A., Schultz, C., Warner, M. A., Schroeder, D. R., & Cook, D. A. (2019). Adaptive instruction and learner interactivity in online learning: A randomized trial. *Advances in Health Sciences Education, 25*(1), 95–109.
- Windisch, H. C. (2016). How to motivate adults with low literacy and numeracy skills to engage and persist in learning: A Literature review of policy interventions. *International Review of Education, 62*(3), 279–297.
- Yanasugondha, V. (2017). A Study of English Vocabulary Learning Using the Dual Coding Theory. *LEARN Journal: Language Education and Acquisition Research Network, 10*(1), 165–175.
- Yin, R. K. (2012). *Applications of case study research* (3rd ed.). SAGE.
- 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.

Appendix A



Working Memory. It is reprinted from *Multimedia Learning* (p. 44) (Rudolph, 2017).

Appendix B

LIBERTY UNIVERSITY AND PINE TREE COLLEGE IRB APPROVAL

Date: 12-25-2023

IRB #: IRB-FY23-24-296

Title: ENHANCING PRODUCTIVE VOCABULARY OF ESL LEARNERS: A QUALITATIVE CASE STUDY

Creation Date: 8-18-2023

End Date:

Status: **Approved**

Principal Investigator: Hala Bastawros

Review Board: Research Ethics Office

Sponsor:

Study History

Submission Type	Initial	Review Type	Exempt	Decision	Exempt
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Key Study Contacts

Member	Rick Bragg	Role	Co-Principal Investigator	Contact	
Member	Hala Bastawros	Role	Principal Investigator	Contact	
Member	Hala Bastawros	Role	Primary Contact	Contact	

Appendix C

Request Approval for Research Study to ABC Director

Dear Patricia,

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for a Doctor of Education degree. My research aims to describe how applying multimedia tools and principles could improve ESL learners' productive vocabulary skills in online courses. I request approval to invite participation from the LINC classes in my study.

Only the clients who participated in our LINC program in the last two years will be sent an invitation to participate. Participation is voluntary, and no compensation will be provided for those who choose to participate.

This study will be very informative for our online programs and can be used to restructure the online courses offered by all the sites in our organization. It can also be shared in partnership meetings, TESL/TESOL publications, conferences, the course development industry, and professional development projects for teachers, course designers, and material writers. Moreover, once the study is completed, it can be shared in our regular meetings with the rest of the organizations and school boards.

Pending approval, an email will be sent to all present and past ESL clients to request their participation.

Thank you so much for your time and consideration.

Sincerely,

Hala Bastawros

Doctoral Candidate

Appendix D

Request Approval for Research Study to Direct Manager

Dear Paula,

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for a Doctor of Education degree. My research aims to describe how applying multimedia tools and principles could improve ESL learners' productive vocabulary skills in online courses, and I am writing to request approval to invite participation from the LINC classes in my study.

Only the clients who participated in our LINC program in the last two years will be sent an invitation to participate. Participation is voluntary, and no compensation will be provided for those who choose to participate.

This study will be very informative for our online programs and can be used to restructure the online courses offered by all the sites in our organization. It can also be shared in partnership meetings, TESL/TESOL publications, conferences, the course development industry, and professional development projects for teachers, course designers, and material writers. Moreover, once the study is completed, it can be shared in our regular meetings with the rest of the organizations and school boards. Pending approval, an email will be sent to all present and past ESL clients to request their participation.

Thank you so much for your time and consideration.

Sincerely,

Hala Bastawros

Doctoral Candidate

Appendix E

Recruitment Email to Participants

Dear Sir or Madam,

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for a Doctor of Education degree. The purpose of my research is to explore how applying multimedia tools and principles could improve ESL learners' (English as a Second Language) ability to retain and produce new vocabulary in online courses, and I am writing to invite eligible participants to my study.

I would like to invite those who are:

1. Enrolled or have been enrolled or attended any online class/course in the past two years in Ontario, Canada.
- 2 Adults who are 18+ years of age.
3. Showing proof of proficiency not below an intermediate level, classified as a CLB score of 5 or higher.

Participants, if willing, will be asked to review a mini-vocabulary lesson and answer some questions based on that lesson. Then, each participant will choose a time for a one-on-one interview via the MS Teams video conferencing platform. You will have the opportunity to review your interview transcripts afterward to check for clarity. It should take approximately 20-30 minutes to complete the procedures listed.

Lastly, you will be sent an anonymous online questionnaire to complete via SurveyMonkey via your email. It should take approximately 10-15 minutes to complete. There is no time limit for you to complete it, but you will need to submit it within 48 hours of receiving the email.

Participation in the survey will be completely anonymous, and no personal, identifying

information will be collected. For the interview, names and other identifying information will be requested as part of this study, but the information will remain confidential (participant identities will not be disclosed).

To participate, here is a link to the screening questions for you to get enrolled:

<https://forms.gle/gyqViUpX7xoR1hFE8>

If you choose to participate, a consent form will be sent to you after you fill in the form above.

Participation in this study is voluntary, and there is no compensation for participating in the research study.

Thank you so much for your time and consideration.

Sincerely,

Hala Bastawros

Doctoral Candidate

Appendix F

Consent Form

Title of the Project: Enhancing Productive Vocabulary of ESL Learners: A Qualitative Case Study

Principal Investigator: Hala Bastawros/ Student/Doctoral Candidate/ School of Education,
Liberty University

Invitation to be part of a Research Study

You are invited to participate in a research study. To participate, you must be:

1. Enrolled or have been enrolled or attended any online class/course in the past two years in Ontario, Canada.
2. Adults who are 18+ years of age.
3. Showing proof of proficiency not below an intermediate level, classified as a CLB score of 5 or higher.

Taking part in this research project is voluntary.

Please read this entire form and ask questions before deciding whether to participate in this research.

What is the study about, and why is it being done?

The purpose of the study is to explore multimedia methods that enable ESL learners to transfer, retain, and produce new vocabulary effectively and gain social and cognitive presence through online learning at a non-profit organization in Ontario, Canada. Vocabulary acquisition and

communication skills are closely interconnected and vital for learners of all ages (Heidari, 2019). The research aims to address the existing gap in the literature and contribute to theoretical, empirical, and practical aspects.

What will happen if you take part in this study?

If you agree to be in this study, I will ask you to do the following:

First, review a mini-vocabulary lesson and then answer some questions based on that lesson.

Second, you will choose a time for a one-on-one interview via the MS Teams video conferencing platform. Afterward, you will have the opportunity to review your interview transcripts to check for clarity. Completing the procedures listed should take approximately 20-30 minutes.

Lastly, you will be sent an anonymous online questionnaire to complete via SurveyMonkey via your email. It should take approximately 10-15 minutes to complete. There is no time limit for you to complete it, but you will need to submit it within 48 hours of receiving the email.

Participation in the survey will be completely anonymous, and no personal, identifying information will be collected. For the interview, names and other identifying information will be requested as part of this study, but the information will remain confidential (participant identities will not be disclosed).

How could you or others benefit from this study?

Participants should not expect a direct benefit from participating in this study.

Benefits to society include contributing to Educational Advancements, promoting Cultural Integration and Diversity, and empowering Fellow Learners through policy practice.

What risks might you experience from being in this study?

The expected risks from participating in this study are minimal, which means they are equal to the risks you would encounter in everyday life.

How will personal information be protected?

The records of this study will be kept private. Published reports will not include any information that will make it possible to identify a subject. Research records will be stored securely, and only the researcher will have access to the records.

- Participants' responses to the online questionnaire will be anonymous. There will be no questions asking for the participant's personal information.
- Participant responses in the online one-on-one interviews will be kept confidential by replacing names with pseudonyms.
- Interviews will be conducted in a one-to-one secure online platform, MS Teams (video conferencing application), where each participant will be given a meeting ID and password to log in. Their names will be kept confidential throughout the process. This will take place in a location where others cannot easily overhear the conversation.
- The research results may be used in future research studies and/or shared with other researchers. If data collected from you is reused or shared, any information that could identify you, if applicable, will be removed beforehand.
- Data will be stored on the researcher's password-locked computer. After five years, all electronic records will be deleted.

- Recordings will be stored on a password-locked computer for five years and then deleted.

Is study participation voluntary?

Participation in this study is voluntary. Your participation decision will not affect your current or future associations with Liberty University. If you decide to participate, you are free not to answer any question or withdraw at any time without affecting those relationships.

What should you do if you decide to withdraw from the study?

If you choose to withdraw from the study, please contact the researcher at the email address included in the next paragraph. Should you choose to withdraw, data collected from you will be destroyed immediately and will not be included in this study.

Whom do you contact if you have questions or concerns about the study?

The researcher conducting this study is Hala Bastawros. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact her at [REDACTED]

You may also contact the researcher's faculty sponsor, Dr. Bragg, at [REDACTED]

Whom do you contact if you have questions about your rights as a research participant?

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, **you are encouraged** to contact the IRB. Our physical address is Institutional Review Board, 1971 University Blvd., Green Hall Ste. 2845, Lynchburg, VA, 24515; our phone number is 434-592-5530, and our email address is irb@liberty.edu.

Disclaimer: The Institutional Review Board (IRB) is tasked with ensuring that research on human subjects will be conducted ethically as defined and required by federal regulations. The topics covered and viewpoints expressed or alluded to by student and faculty researchers are those of the researchers and do not necessarily reflect the official policies or positions of Liberty University.

Your Consent

By signing this document, you agree to participate in this study. Make sure you understand what the study is about before you sign. You will be given a copy of this document for your records, and the researcher will keep a copy of the study records. If you have any questions about the study after you sign this document, you can contact the study team using the information provided above.

I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study.

The researcher has my permission to audio-record me as part of my participation in this study.

Printed Subject Name

Signature & Date