

Dedication

I dedicate this work to myself for doing all this hard work.

I dedicate this work to all who are dear to me.

To my loving parents whose affection, caring, and encouragement cheered me up along my academic journey and their prayers that led me to such success and pride.

To my siblings for helping overcoming the stress encouraging me and standing next to me till the end, and

To my dearest friends Zhour, Khadija, Nour, Chahra and Meriem thank you for believing in me.

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Abstract

This study attempts to investigate the EFL learners' attitudes toward digital note-taking and its impact on their listening comprehension in the Department of English at the University of Ammar Thelidji. The theoretical framework of this research is based on a set of theories that serve as a road map to fully comprehend the entire study. To achieve this work, an online questionnaire was distributed to 25 Master One ELT students who were randomly selected. A mixed-methods approach was employed, combining both qualitative and quantitative methods. The conclusion drawn from the results of this study is that learners believe that digital note-taking has a positive influence on their listening comprehension skills. Additionally, findings also confirm that EFL learners need such tools to ensure pedagogical improvements for both learners and educators, consequently enhancing learners' listening comprehension abilities and overall academic performance. Moreover, the results revealed that learners show positive attitudes as they are engaged and motivated to learn new technological trends, such as digital note-taking.

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List of Abbreviation and Acronyms

EFL: English as a Foreign Language.

ELT: English Language Teaching.

LSRW: The Four Language Skills; Listening Speaking Reading Writing.

WM: Working Memory.

WMM: Working Memory Model.

CLT: Cognitive Load Theory.

A decorative horizontal scroll graphic with a light gray border and rounded ends. The scroll is unrolled in the center, with the text 'General Introduction' written inside. The scroll has a slight 3D effect with a darker gray shadow on the top and bottom edges.

General Introduction

Mastering the four language skills is essential for language learning success. In the EFL context, listening comprehension has been considered a core skill that plays a vital role in language acquisition. Modern strategies such as digital note-taking have emerged as an effective tool to enhance learning, specifically to improve listening comprehension. Digital note-taking ensures active engagement with the content and fosters a positive learning atmosphere. Ultimately, through the strategic use of these tools, EFL learners' academic performance flourishes.

1. Background and Significance of the Study

Listening comprehension is regarded as crucial for grasping lexical input. Processing information, understanding, and retaining auditory feed is essential to manifest effectively in numerous academic and communicative tasks. Yet, EFL learners may face obstacles while grasping concepts and retaining spoken information because the traditional methods of taking notes, which rely heavily on handwriting, may not be the best option for learners who process information auditorily. Consequently, several issues may arise, such as cognitive overload, difficulty in listening and understanding simultaneously, and recording key concepts accurately, resulting in poor-quality notes. Thus, traditional notes lack technological support that aids auditory learners efficiently, ensuring engagement and a dynamic learning experience. Listening comprehension is a set of complex cognitive processes in which learners decode and store information received orally. Innovative strategies have been introduced recently to enhance language learning, as digital note-taking. This method has emerged as an efficient tool that enables learners to record, analyse, and recall lecture content in real time, strengthening memory retention and recall of the input comprehensively. Interesting options are delivered through digital note-taking, multimedia elements that offer audio recording, incorporating visuals and diagrams, and editing. It has gained some

recognition lately in the context of EFL learning to reinforce listening comprehension and boost overall academic performance.

With the rapid technological changes reformulating education, it becomes necessary to investigate recent strategies that enhance listening comprehension and learning outcomes. Some research studies have indicated that notes recorded digitally enable learners to process information effectively, promote critical thinking, and recall input when required. Despite its potential gains, digital note-taking remains an unexamined zone in EFL learning. This study attempts to bridge the gap by investigating EFL learners' attitudes toward the effectiveness of digital note-taking in enhancing listening comprehension and whether multimedia elements can foster better retention and overall academic performance. The value of this study lies in its potential to address EFL learners' attitudes towards such innovative tools and their impact on educational achievement. The study examines the effect of digital note-taking tools on EFL learners' listening comprehension and suggests pedagogical changes that benefit learners.

2. Statement of the Problem

Listening comprehension is essential in EFL learning, though many learners, specifically auditory learners, strive to grasp and retain spoken input. Traditional note-taking strategies, which rely on written information, may not be the best option for those who learn best via listening. Auditory learners may encounter obstacles while capturing essential points and often when applying what they have learned in real situations. As a result, procedures must be taken to ensure positive and interactive learning and better academic achievements. To overcome these challenges, incorporate multimedia within digital notes such as audio recordings, voice notes, and editing. Offers a potential solution, as it aligns with auditory learners' style, including aspects that serve their learning needs. However, some research has been conducted concerning integrating multimedia elements within digital notes in EFL

classrooms. These findings evoke critical inquiry into how digital tools help EFL learners improve their listening skills.

3. Research Questions

For this study, a set of questions have been raised to investigate the effectiveness of digital note-taking and to explore EFL learners' attitudes towards and testing the undermentioned hypotheses.

1. How do EFL learners perceive digital note-taking versus traditional approaches in terms of effectiveness?
2. To what extent is digital note-taking beneficial in enhancing EFL learners listening skills?
3. How does the use of multimedia in digital notes affect the EFL learner ability to recall and understand lecture content?

4. Hypotheses

This study seeks to test the following Hypotheses:

- Using digital note-taking profoundly enhances EFL learners; listening abilities along with multimedia integration that strengthens auditory learning.
- EFL learners perceive digital note-taking as significantly effective compared to traditional methods due to its ability to boost their retention and listening skills.
- Integrating multimedia elements within digital notes improves EFL learners' capability of understanding and recalling lecture content, as it involves various features that align with diverse learning styles.

5. Research Aim

This research aims to explore the attitudes of EFL learners towards the effectiveness of digital note-taking in enhancing their listening comprehension skills. It sheds light on auditory learners who benefit the most from especially processing spoken information, improving memory retention, and fostering engagement. Considering its strengths and weaknesses, this study seeks to provide a comprehensive insight into the effectiveness of technology-assisted strategy and how it creates a personalized and conducive learning experience. The study investigates EFL learners; perception of such a tool and how multimedia features in digital note-taking support EFL learners in processing spoken input, improving memory retention, ensuring engagement, and promoting academic progress.

6. Research Objectives

The current study aims to reach the following objectives:

- To evaluate the impact of digital note-taking tools on the overall academic achievement
- To compare the effectiveness of digital notes with the traditional method of pen and paper in boosting listening comprehension
- To investigate the impact of digital notes on different aspects of listening, such as vocabulary retention and understanding spoken input.
- To examine the role of multimedia features in digital note-taking (e.g., audio recordings, visual aids) in supporting auditory learners.

7. Methodology

This study will adopt a descriptive quantitative approach to investigate the attitudes of Master One ELT university students of English towards digital note-taking and its impact on

listening comprehension. Data will be collected using a questionnaire to explore learners' views, habits, and experiences. Through descriptive analysis of their responses, the study aims to offer insights into how digital note-taking practices influence listening skill development and contribute to learners overall academic performance in EFL contexts.

8. Previous Studies

Recently digital note-taking tools have gained notable attention as helpful educational tools. Due to its' function in processing EFL learners' auditory input. This literature explores the findings in the area of EFL learners' attitudes towards digital note-taking and its impact on listening comprehension, with the focus on Laghouat University ELT students demonstrating the relationship between the two variables. Additionally, exploring the potential gaps and calls for further explorations in the EFL context. Several studies have examined the impact of technological devices on listening comprehension. For instance, each of the following researches focused on a specific zone of interest, such as laptop note-taking, and exploring learners' perception towards this technique and all what is related to listening comprehension.

A study conducted in 2024 by Shi and Yu entitled *The Effects of Laptop Note-Taking on Students' Learning Performance, Strategies, and Satisfaction* has revealed the widespread use of laptop note-taking due to COVID-19. Therefore, the study enhances the organisation and quality of notes, which gradually affects students' learning strategies, improves their academic performance, and increases their satisfaction level. The impact of such tools relies on students' strategies. Despite the benefits of laptop note-taking, several limitations were found, such as distractions and multitasking, which negatively affect overall learning. The researchers proposed further studies to adapt pedagogical strategies to pinpoint the drawbacks of laptop note-taking and examine external factors that may influence learning.

Moreover, students' perceptions of note-taking strategies during listening activities were examined by Lekatompessy (2021) at Pattimora University. Using classroom observation, surveys, and questionnaires, findings indicated that 90% of learners had a positive perception of the effectiveness of note-taking in strengthening their listening skills. Students reported more benefits than drawbacks concerning these strategies. This study highlights the significant role of conventional note-taking methods in improving EFL learners' listening comprehension. Despite the benefits of note-taking, the study also faced some challenges, such as a lack of comparative analysis of different note-taking strategies and a limited sample size of 46 students out of the entire university population, affecting the generalisability of the findings. Further investigations are called for to increase note-taking quality and address factors influencing learning.

Additionally, Erwin, Muh, and Muhsin (2024) at Muhammadiyah 2 Bontoala University explored another impact of note-taking strategies to enhance students' listening skills. This study investigated how such strategies can improve students' processing abilities of verbal language. A listening test was applied to measure students' listening skills. Findings revealed a progression increasing from 45.00% to 69.97%. These results emphasize the effectiveness of note-taking methods in enhancing listening skills.

Similarly, at Inner Mongolia University for Nationalities, valuable research by Xiaoli (2020) investigated how note-taking methods affect passage listening comprehension for over 15 weeks. Participants were divided into two groups, an experimental and a control group. Results showed that note-taking methods positively influenced students' listening abilities, emphasizing the importance of producing well-structured notes rather than random writing.

Although the previous studies have examined note-taking strategies and their influence on listening comprehension, research gaps still occur. Shi and Yu (2024) examined laptop

note-taking tools; however, they did not target listening comprehension; they, rather, focused on overall academic performance. Muhsin (2024) and Lekatompessy (2021) emphasized students' perceptions and strategies towards traditional rather than digital note-taking. Similarly, Bao (2020) focused on training note-taking, focusing on pen and paper methods, without considering digital note-taking practices.

In light of the previous studies, this study aims to investigate EFL students' perceptions of digital note-taking and its role in enhancing listening comprehension. It specifically focuses on the impact of multimedia elements in supporting comprehension, real-time information processing, and retention. The study also intends to fill a gap in the existing literature by offering a more robust theoretical framework. Centered on Master one ELT students at Laghouat University, this research explores the relationship between digital note-taking and listening comprehension, while identifying gaps in current knowledge and emphasizing the need for deeper exploration within the EFL learning context.

9. Structure of the Study

This study is composed of three chapters, exploring EFL learners' attitudes towards digital note-taking and its impact in enhancing listening comprehension. Chapter one, a theoretical foundation, examines listening comprehension in EFL learning highlighting definitions and theories. Chapter two, a theoretical foundation, examines digital note-taking as a cognitive strategy in EFL listening comprehension, and providing a detailed overview of digital note-taking. Chapter three focuses on exploring the chosen mixed descriptive approach, including the chosen data collection methods, data analysis techniques, and the sample selection reasons along with providing a comprehensive overview of the questionnaire's structure, administration in addition to interpreting the data, presenting findings on EFL learners' perceptions concerning digital note-taking, and the potential

benefits and challenges associated with its' impact on listening comprehension skills, finally explore how these findings connect to the theoretical framework established in Chapter one and two.

10. Defining Key Words

Digital note-taking: Electronical devices to document notes and to organize them for educational purposes, which allows flexibility in editing and connecting notes (University of Auckland, n.d.).

Multimedia features: Elements found in digital devices such as images voice notes audio recording, these features are used to facilitate learning and improve engagement (Vagg et al., 2020).

Listening comprehension: refers to the ability to understand spoken input, and it involves complex cognitive processes (Hogan et al., 2014).



Chapter One

Listening Comprehension in EFL Learning: Theoretical Perspectives

Introduction

Listening comprehension has become one of the areas of research that has raised profound attention in the field of learning a foreign language; its significance lies in the learner's ability to process spoken input accurately in different tasks. As a comprehension skill, listening is considered the pillar of effective communication, as it provides learners with large amount of input throughout their language acquisition. During the listening process, learners must comprehend verbal input, store information in memory, and retrieve it when needed. Hence, listening is not simply receiving a spoken message; it is beyond that ease. It consists of complex cognitive processes in which listeners depend on their linguistic knowledge to understand the intended message; without understanding the input appropriately, learning cannot be enhanced. This chapter defines listening comprehension as a dynamic process and mentally challenging ability in the EFL context and draws attention to working memory. Furthermore, this chapter identifies digital note-taking as a helpful tool for improving listening comprehension. This theoretical framework acknowledges difficulties and provides a profound foundation for exploring the significance of listening comprehension and how digital note-taking contributes to aiding EFL learners' listening comprehension and overall academic performance.

1.1. Defining Listening

Numerous research studies have explored the notion of listening comprehension in the context of foreign language teaching and learning. Moreover, listening is the capability of identifying and understanding spoken information; it is an active and cognitive process that requires attention and recalling prior knowledge to interpret different sounds, vocabulary, and tone and differentiate between them as well. Within the context of EFL learning and teaching, it is important for EFL learners to master this essential skill, which can be viewed as the

starting point in their learning process since it provides the basis for effective communication and contributes to their overall proficiency. Listening is not only one of the four language skills; rather, it is the ability to understand, produce, and interact in the target language.

Vandegrift (1999, as cited in Dhanapala, 2019, p. 22) illustrates the notion of listening as being something beyond a passive task. Yet, it is a complicated activity which requires active processes in which the listener distinguishes between different sounds and comprehend vocabulary as well. Stimulatingly, with interpreting the received input. These aspects when coordinated will generate a great cognitive activity on the part of the listener. Overall, listening is a complex activity that requires support to ensure a smooth operation of the input.

Thomlison (1984) and Hamouda (2013) defined listening as "the ability to recognize and understand what others are telling. This process includes understanding a speaker's pronunciation, the speaker's grammar and vocabulary, and understanding of meaning " (as cited in Gilakjani & Sabouri, 2016). That is to say listening is described as the process of comprehending once grammar, vocabulary and different language aspects in order to understand the intended meaning. Similarly, Purdy (1997) describes listening as an attentive and interactive process that involves a set of cognitive procedures such as focusing, detecting, understanding, recalling, and reacting (verbally and non-verbally) to desires, issues, and information given to individuals.

Listening is an essential skill in the context of EFL learning, which serves as a core capability to master any language. Moreover, listening is a complex process that requires much attention and focus, since it involves a set of cognitive processes, including concentrating, understanding, and decoding spoken input. Therefore, ensuring effective listening is a crucial step toward better understanding and improved academic performance.

1.2. Theoretical Perspectives on Listening Comprehension

Listening comprehension is a dynamic process that involves a set of mental processes. Numerous theoretical frameworks have been produced to explain the entire process, offering a comprehensive overview of listening comprehension. Therefore, to reinforce such skill to ensure better understanding.

1.2.1. Significance of Listening Comprehension

Listening is often the primary skill to develop; it sets the foundation of comprehension, assisting EFL learners to capture meanings and words. Without attentive listening, understanding the language in real time becomes impossible since it serves as a means to improve EFL learners' academic performance and overall comprehension and contribute to their personal growth. Listening is an important skill in improving communicational skills. Unless the content is listened to and understood thoroughly, the learners cannot communicate properly.

Effective listening needs a strong mind to understand the context; learning a language is a dominant part of academics and social life. Several studies argued that listening plays a crucial role in developing communication skills. For the development of a learner's personality, language learning is vital, and the English language is a gateway to the world for learners. Some studies showed that among LSRW skills of English, the learners spend 45-55% of their time on practicing listening skills. Though listening plays a vital role in enhancing communication skills, the teachers still ignore the listening skill, and it is not properly taught in many educational institutions (Mendelsohn, 1994, p. 9; Sree Vani & Naik, 2023, p. 10). Therefore, listening is an essential competence that increasingly enriches our communication skills. It serves as a significant base for meaningful interaction; without comprehensible listening, learners fail to engage with daily discussions.

1.2.2. Differentiating Hearing from Active listening in EFL Contexts

Realizing the distinction between active listening and hearing is a must, particularly in the EFL context. Despite the common misinterpretation of these terms, they are distinct processes. By acknowledging the contrast, EFL learners can cultivate the awareness necessary to enhance their overall listening comprehension. To teach listening skills effectively, it is necessary to distinguish between listening and hearing; though many EFL learners consider them identical, they are not. Listening is a conscious process that requires full attention and focus. Whereas hearing refers to the unconscious process without full engagement and attention. For that, EFL learners must realize the difference to perform well (Sree Vani & Naik, 2023, pp. 10–11).

Thus, according to Rost (2006), though hearing provides a basis for listening, it is only a precursor for it. The terms hearing and listening are frequently used interchangeably in everyday talk, yet there are essential differences between them. While both hearing and listening are initiated through sound perception, the difference between them is essentially a degree of intention. Intention is known to involve several levels; initially intention is an acknowledgement of a distal source and a willingness to be influenced by this source (Allwood, 2006, p. 12). The distinction between each lies on the level of intention; while hearing occurs naturally as a stimulus for the ear, listening is a conscious behaviour that involves interpreting sounds where the intention is the key element. Allwood states that a distal source implies the cause of something; accordingly, to the current situation, it refers to the origins of the captured sounds.

Moreover, realizing the difference between listening and hearing is important for improving how listening is approached. Listening is an active process that requires one to actively engage with the material received. While hearing is a passive process which involves

spotting sounds (Kline, 1996, as cited in Yıldırım & Yıldırım, 2016, p. 2096). Ultimately, highlighting the difference between listening and hearing is the foundation for effective listening skills; by understanding that listening is an active, engaging, and conscious ability, EFL learners can deeply manifest in spoken language. Teachers and learners must focus on the differences to create a better learning environment and improve learning outcomes.

1.2.3. The Components of Listening Comprehension

Listening involves a set of complex cognitive processes, such as sound recognition, and realization of words' meanings. Assumptions are made about what's coming next, comparing the received input with prior knowledge. To overcome difficulties, learners develop strategic plans such as preparing answers or assumptions based on recent information to get involved in dynamic interaction. All these mental processes happen at once, indicating the significance of listening. Vandergrift and Goh (2009, as cited in Nemtchinova, 2013, pp. 2–3) discuss listening as a dynamic mental skill that requires processing sounds, understanding, and recalling things all at once. When learners listen to spoken input, they grasp vocabulary, expect upcoming events, and assess recent perceived material with previous knowledge.

Short-term memory is crucial in this context because it briefly holds verbal information before its elimination or shifts to long-term memory for upcoming recall. Therefore, learners begin with the initial stage of listening which is perception where they get to process auditory input by detecting sounds and distinguishing them from background noise. This includes recognizing sounds and tones to make sense of the received input which allow students to better comprehend information before moving to the next stage. For that, if the received data is relevant, it moves for further processes. Then, processing appears as a cognitive procedure that involves decoding spoken information. The brain interprets data and

anticipates upcoming events, comparing existing knowledge with earlier content; whereas the listener interprets the existing information with their assumptions and pre-existing mindset. Finally, we have retention as the last component, which is maintaining the information enough to use it successfully. If the message conveyed is meaningful, it moves to short-term memory or long-term memory. These stages of listening comprehension bridge the gap for EFL learners to effectively pick up sounds, understand concepts, and remember the information so it can be used later on.

Listening comprehension is the backbone of effective communication and serves as the starting point to perform any task. Several studies have demonstrated the importance of listening comprehension as discussed above; additionally distinguishing the difference between listening and hearing is necessary to ensure comprehensive learning and boost learners' academic achievement. Therefore, listening involves a set of complex stages that requires full attention to completely understand how it functions, which serves EFL learners to effectively process sounds and recall information. Overall, listening comprehension is the key ability that EFL learners must be aware of to overcome difficulties and ensure better academic outcomes.

1.3. Traditional Note-Taking Methods' Challenges in Supporting Listening Comprehension

Note-taking is a core ability that involves recording and summarizing ideas, whether inside the classroom or elsewhere. It enables students to document thoughts in a shorter and more simplified format. Furthermore, note-taking is an essential learning ensure a successful learning journey, it is an effective technique due to its benefits in promoting listening comprehension, retention, and fostering critical thinking.

According to Zhang (2012, as cited in Özçakmak, 2019, p. 580), "note-taking is identifying the essence of what is being said, focusing on the key point from the information presented during listening." Developing effective note-taking techniques can better learning outcome as well as overall academic success. Additionally, Di Vesta and Gray (1972) studied the components of note-taking activities and found two essential functions that support the learning process: encoding and retrieval processes. The encoding perspective means that simply taking notes enhances learner performance, and the retrieval process facilitates the review, organization, and reconstruction of knowledge (Mosleh & Baba, 2013, p. 3).

Research has shown that the act of note-taking is not that simple; it involves a set of cognitive processes such as encoding, which is simply grasping information so it can be remembered, and retrieval, which means pulling back the stored information in the memory if needed (Piolat, Olive & Kellogg, 2005); these functions support reviewing and rebuilding knowledge effectively. Moreover, EFL learners possess various learning styles and strategies in taking notes; they have individual choices on the material being presented. This distinction calls for having two approaches to taking notes: either in an organized format or in sequential order.

According to Hartley (2002), individuals adopt various techniques regarding their notes. The selection of their styles varies depending on certain aspects such as personal preferences, and the content presented. Notes are generally organized in different formats, whether linear sequences or structured layouts. Traditional note-taking methods have been used for centuries; these methods are diverse and efficient in catering to learners' needs.

While taking notes, writing becomes the main obstacle since speaking speed is faster and directly linked to listening. This fact may create confusion and misunderstanding of the spoken input. Additionally, students cannot write down word by word while the teachers are

speaking, making it difficult to keep up and stay on track. In this context, Özçakmak (2019, p. 587) explained:

Speaking speed, comprehension speed, and writing speed should be mentioned for note-taking. Comprehension speed is more than speaking speed, and speaking speed is more than writing speed. Each word spoken can be understood, yet writing may be problematic. Therefore, trying to write everything a teacher tells you may make this skill too difficult to overcome.

Time constraints are considered an obstacle in which note-takers struggle to match the high speed of spoken content (2 to 3 words per second) compared to their slower writing (0.2 to 0.3 words per second); much of the time is consumed in processing and summarizing information, leaving less limited time for actual writing. Due to these constraints, notes are often produced in a rush, leading to errors in grammar and spelling which are seldom revised. Unlike drafts of formal documents, while some people rewrite their notes; generally, it is done for the aim of reviewing the content rather than improving the quality and accuracy of their work (Piolat, Olive & Kellogg, 2005).

Additionally, most EFL learners unconsciously develop simplified strategies of recording notes. These strategies often include the use of abbreviations, reducing lengthy words, and relying on key terms. Note-takers are also aware of the volume of notes they generate. Therefore, they aim to reduce the time spent writing full sentences and concepts. Consequently, the emphasis on minimizing the time spent in writing will prevent EFL learners from fully capturing the main ideas and concepts affecting their comprehension and later review of the content (Siegel, 2022).

Moreover, another limitation of traditional note-taking is cognitive overload that occurs at the limited ability of the working memory (WM). According to Piolat et al. (2005, as cited in Friedman, n.d., p. 7), students fail to combine comprehending and recording

information due to the limitations of their WM. Consequently, students compromise on the two tasks and choose whether to understand or write down their notes. In an EFL context, this problem hinders learners' listening comprehension when they get to process spoken input simultaneously with capturing the main points in written form. Traditional note-taking imposes cognitive strains on EFL learners, affecting their ability to understand and retain spoken input, which reduces their capability of understanding and the using the material. Traditional note-taking shortcomings were highlighted effectively, particularly for EFL learners since the process of capturing spoken input is challenging (Friedman, n.d.).

1.4 The Emergence of Digital Note-Taking as a Potential Cognitive Strategy to Enhance Listening Comprehension

An increasing number of learners prefer to record their notes using computers and phones (Hamat et al., 2024); digital note-taking acts as a means to reach better learning outcomes due to its crucial accomplishments in enhancing EFL learners' lecture comprehension. Therefore, EFL learners can instantly record information, which permits memory retention when necessary and enhances overall learning outcomes.

Ruan et al. (2018) demonstrate that digital note-taking has contributed effectively in enhancing storage, speed, and real-time knowledge processing. Yet, it has changed the ease of using the classic tool of writing notes. Furthermore, it can be perceived as a guideline for them to improve their overall understanding features such as audio recording, editing, and voice notes, allowing flexibility and an engaging learning atmosphere, enhancing recall abilities. Thereafter, different learning styles are managed successfully. Digital note-taking ensures a dynamic learning environment, reinforces critical thinking, and promote collaborative learning through interactive features such as shared notes discussed with peers and exchange feedback. Overall, digital notes empower EFL learners to govern their learning

journey, considering their effectiveness in serving as a road-map for successful second language acquisition.

Pitura (2023) demonstrated the significance of digital note-taking tools in aiding learners and facilitating the learning process due to the benefits that it involves, such as flexible features like voice notes. Moreover, such tools includes a set of benefits such as effective editing, storage capacities which enables as much notes as possible which can't be found in the traditional methods.

Digital note-taking has emerged as an assisting cognitive strategy to improve learning and enhance listening comprehension in particular. Moreover, digital platforms offer a variety of advantages, especially when integrating multimedia features that enable a convenient experience, particularly in language learning. Overall, listening comprehension is a valuable skill that must be improved; digital note-taking can serve as a guide to reach satisfying results.

1.5 Working Memory and Listening Comprehension

Alan D. Baddeley and Graham Hitch are elaborating upon this cognitive structure. This model discusses the role of memory in processing spoken data. Comprehending verbal language is challenging since it involves a set of mental processes, such as retention and interpretation of language. Baddeley and Hitch highlight the significance of working memory in managing oral language, particularly in problem-solving tasks. Additionally, it was defined as follows:" The concept of working memory proposes that a dedicated system maintains and stores information in the short term and that this system underlies human thought processes" (Baddeley & Hitch, 2003, p.829). Therefore, it was described as a limited mental capacity that stores information temporarily and plays a crucial role in interpreting human ideas.

1.5.1 Baddeley and Hitch's Working Memory Model (1974, 2000)

Alan D. Baddeley and Graham Hitch proposed that WM is composed of three components instead of one single storage system. These components are the central executive, supported by two distinct memory systems: the phonological loop that processes sound and language and the visuospatial sketchpad that is responsible for visual and spatial information, helping us to picture things. Each component has a particular function and is responsible for different types of processing and storing (Baddeley, 2003)

1.5.1.1 Phonological Loop

Baddeley (2003) introduces this component of working memory as being responsible for processing sound-based information. The book suggests that there are two subcomponents, which are:

➤ Phonological store:

Known as the inner ear because it receives and stores sounds before they fade. Basically, it stores auditory information for the short term.

➤ Articulatory control process:

Also known as the inner voice as it rehearses verbal information; it helps to prepare speech and repeat words to keep them (WM) for longer.

Limited memory span (the amount of information we can remember) was mentioned in favor of the previous components. Once one tries to remember many things at once, the first elements can vanish before having the chance to refresh them. This is due to the limitation of short-term memory function, which processes things in real-time, so there's a limited space for holding data. When we listen to or read something, it stays in short-term memory for a while. To keep it for longer, a learner rehearses it. However, short words are easy to remember and take less time to repeat compared to lengthy ones. Even if the words begin

with similar sounds such as V, P, or B, they can be mixed up and negatively affect recall (Baddeley, 2003, p. 830).

The phonological loop is essential for enhancing listening comprehension because verbal information is an ongoing and brief process, having no chance to stop and think, unlike documented passages. Without a system for briefly grasping auditory data, EFL learners may struggle to process oral input in real-time, missing the link between ideas, which can be a difficulty for them when listening to a given speech with a limited time to process meaning. This fact can be overwhelming when learners engage with their phonological loop; they are training their brain to store and recall auditory information. This can reduce confusion by making real-time comprehension smoother and reducing mental fatigue that results from unfamiliar accents or complex grammar. To reinforce such a skill, shadowing is the best technique, where EFL learners repeat what they hear quickly. This technique not only improves retention but also improves pronunciation and fluency.

1.5.1.2 Visuospatial Sketchpad

This system known as the inner eye, proposed by Baddeley (2003), is responsible for processing and storing visual and spatial information. However, it has limited capacity, such as phonological loop, and can hold three to four objects at once; as such, one can only remember a few objects at a time. However, there's a distinction between visual memory (recognizing forms and shapes) and spatial memory (recalling places and actions). Visual representations can be created in our minds from descriptions; for example, when reading a passage about a house or a room, we can mentally visualize the layout. The ability to form a mental image can enhance memory retention and improve understanding. Visuospatial sketchpad can be classified into two parts. (1) Image storage, which holds visual information.,

and (2) spatial processor, which manages locational factors such as action and place (Baddeley, 2003, p.834).

These parts work together, but one of these functions can be disrupted separately; for instance, individuals with brain damage who show weakness in either visual memory, meaning they struggle to recall shapes, or spatial memory, meaning that patients cannot remember locations. For EFL learners, the ability to mentally visualize concepts from oral input can facilitate the process of understanding and turning abstract information into something more tangible (Baddeley, 2003, p.834).

By creating cognitive visuals, EFL learners establish a significant connection between new vocabulary and already known concepts, boosting retention and facilitating retrieval. This ability is useful when interpreting explanations and stories, aiding learners to arrange information effectively. Methods like mind mapping and drawings can make a clear link between the language and visuals which enables both systems to assist comprehension.

1.5.1.3 Central Executive

Baddeley (2003) describes the central executive as the most important component because it's in charge of the following elements: the phonological loop and visuospatial sketchpad which are referred to as slave systems as they are under the control of the central executive. The central executive determines what should be paying attention to and whether the phonological loop or the visuospatial sketchpad does the work. This fact often occurs when the working memory is overloaded with much information, so it decides which part of working memory should be prioritized. However, it doesn't store information. Yet, it decides what information should be kept and what should be ignored as well; think of it as the manager.

Moreover, the central executive has a key function, such as controlling attention and prioritizing essential information. Interacting with long-term memory, it connects short-term data with retained knowledge (e.g., comprehending a passage based on terminology you already have). Finally, discipline and decision-making are associated with self-regulation for overcoming distractions, notably in academic activities such as listening and note-taking (Baddeley, 2003, p.835).

The central executive is the mental director since it regulates attention and helps in handling multiple tasks. For EFL learners, it plays a significant role in overcoming the challenges of lecture listening. It directs their attention to necessary, dismisses distraction, and integrates new information with prior input. While listening can be taught in a foreign language, the central executive works to avoid overload. Effective note-taking strategies can improve understanding, particularly digital note-taking, which facilitates the process.

Lastly, in 2000, Baddeley updated the working memory model (WMM) after a number of studies investigating its effectiveness, because the WMM could not explain how long-term memory could be brought into working-term memory. Another gap can be illustrated in how sound and visual information can be integrated; as a result, another component was added called the episodic buffer.

1.5.1.4 Episodic Buffer

The episodic buffer integrates information from all components of working memory (WM) as well as long-term memory. Furthermore, it is controlled by the central executive and permits conscious awareness of what is being stored in working memory. This component is not limited to one type of encoding. Rather, it can store and process both visual and verbal short-term memory, as it provides multi-model temporary storage of cognitive tasks (Baddeley, 2003, p.836).

1.6. Application of the Model to Enhance Listening Comprehension

Listening comprehension can be enhanced through the implementation of the working memory model. Therefore, it serves as a road-map to reinforce learning outcomes along with empowering listening comprehension. And boost learners' academic achievements.

Listening comprehension requires learners to complete a set of cognitive procedures, such as processing, retaining, and recalling auditory information. Working memory has the function of managing constant auditory information; the model suggests that working memory is responsible for managing and organizing data instantly. In listening tasks, that's what matters, where learners need to retain chunks of oral data for a while, processing them as they hear more speech. For EFL learners, holding these chunks is crucial because it enables them to track the speaker's message, make sense of all language structures, and identify key points in real-time.

The phonological loop, a component of WM, is necessary for language processing; it helps learners to keep auditory data long enough; that it may be integrated with existing knowledge later on. EFL learners can benefit from this essential component because it helps them retain unfamiliar vocabulary, information, or specific details from oral discourse, which they can apply later on in a meaningful way. Additionally, the central executive guides and organizes different components of WM by allocating attention. For example, when listening to a lecture, the central executive controls the flow of spoken input by setting the focus on the most important elements while ignoring unnecessary details and automatically storing the initial points, ensuring effective comprehension of the auditory information. The episodic buffer combines spoken input with existing knowledge, improving and boost in understanding and recall.

Efficient note-taking strategies are significant in improving cognitive retention by documenting information that would generally overwhelm a learner's thinking ability. By turning auditory content into a written form, learners can create space for processing other aspects of listening comprehension, such as recognizing key themes or understanding complex language structure. Digital note-taking offers additional advantages, unlike traditional methods of note-taking. Technological tools are known for their speed, flexibility, and integration of multi-modal features (e.g., images, and videos). Digital note-taking allows organizing and structuring notes more effectively, assisting the central executive role in controlling mental functions.

Note-taking apps with voice-to-written tools enable learners to document spoken language more efficiently, and mind mapping also contributes to making sense of ideas, helping to reduce cognitive strain. Additionally, digital tools enable learners to revisit and enhance their notes, promoting a more profound understanding. In this case, incorporating digital note-taking methods improves working memory and helps EFL learners interpret spoken input effectively, consequently enhancing their listening comprehension.

1.7. EFL learners' Obstacles during Lecture Listening

While lecture listening EFL learners encounter a set of obstacles, which may hinder the process on learning overall and listening comprehension in specific. Therefore, raising awareness over these challenges serves as a guideline for EFL learners to overcome difficulties and function effectively.

1.7.1 Cognitive Overload Difficulty

Cognitive Overload Theory (CLT) clarifies how people learn and the causes behind the difficulty of grasping fresh material. It was established by Sweller (1989) and published in a

journal called Cognitive Science, which relies on the notion that our working memory, the part responsible for processing information instantly, has a restricted ability and holds a limited quantity of information for a while. The brain becomes overloaded if too much information or complex concepts are presented at once, which hinders the process of understanding and recalling information. CLT splits knowledge into biologically prior knowledge (such as one's mother tongue) and biologically secondary knowledge (such as a foreign language). Secondary knowledge involves a set of cognitive efforts since it requires instructions and active processing of the WM. As learners acquire a second language, their WM is disturbed by the parallel processing of both content and language, resulting in overloading. This theory, in particular, is useful to showcase the obstacles that EFL learners may encounter in their lecture listening. When they are required to absorb new information and a foreign language at once, that may strain their working memory. To gain a profound insight into these cognitive challenges, three types of CLT are proposed: intrinsic load, extraneous load, and germane load (Sweller, 2011).

When EFL learners attend lectures in English, they are exposed to complex concepts (intrinsic load) conveyed in a foreign language (extraneous load) together, trying to develop a meaningful representation (germane load). It is a situation where mental overload surpasses the learner's processing ability. Consequently, hindering understanding and recalling. As Sweller demonstrated in his CLT, working memory has a limited capacity for interpreting novel information, particularly when dealing with biologically secondary knowledge.

Moley (2001, as cited in Rahimi & Sayyadi, 2019) argued that listening comprehension is the most direct and difficult to track among all language skills. Moreover, for EFL learners, this important skill requires high mental effort. Effective mastery of lecture listening in an EFL context calls for the combination of both bottom-up which, is related to

decoding the data at the level of audio and word such as distinguishing phonemes. While, top-down processing has to do with the audience's prior knowledge and mental framework and making sense of it through comprehending situational messages. Furthermore, the bottom-up process hinders EFL learners' listening in many ways, such as mismatching between the speed and continuous speech that complicates the task of identifying words and sounds. Additionally, the extensive usage of elision and the smaller form of the, words such as "gonna," that are not standard English.

Additionally, the top-down process also involves a set of disadvantages, such as restricted prior knowledge. If the students fail to understand the lecture content, logically they cannot predict upcoming data, and cultural cues like idioms of L1 may confuse L2 listeners. However," relying on one of these processes separately would hinder comprehension or lead to misunderstanding. Why the listener would prefer one process over the other depends on listeners' socio-cultural (e.g., L1/L2 cultural differences, background knowledge) and individual factors (age, gender, language proficiency) as well as the difficulty of the listening task or its cognitive load (Rost, 2006, as cited in Rahimi & Sayyadi, 2019, p. 384). In other words, listening comprehension is a combination of understanding language and what we hear (bottom-up), then making further guesses based on our existing input. If we balanced between these two, understanding becomes an easy task.

1.7.2. Mismatch between the Speed of Spoken input and Learners' Processing Capacity

This refers to the difficulty that learners encounter when trying to understand spoken input, which is fast and takes a while to process the information effectively. Listeners are expected to decode and comprehend the auditory message (bottom-up process), stimulatingly making sense of meanings based on prior knowledge. If the speaker talks rapidly, learners will

struggle to process data in real time. Moreover, cognitive load is involved because listening comprehension is complex. If the speed of the discourse is faster than the learner's processing system, their thinking abilities result in an overload and hinder retaining and understanding of the content.

1.8. Cognitive Perspectives in Note-Taking in EFL Context

Note-taking is not a simple process; rather it is a complex cognitive strategy that requires much focus and mental processes. There is a need to comprehend these processes to gain an in-depth understanding of the relationship between listening comprehension and note-taking.

1.8.1. Note-Taking in Supporting Listening Comprehension

Effective comprehension requires effective note-taking strategies; therefore, pursuing meaningful learning can only be achieved through taking notes during lectures (Özçakmak, 2019; Kiewra, 1991). That is to say, note-taking techniques are useful in academic settings because they facilitate learning, particularly in lectures, ensuring a better engagement with the material. According to a study by Özçakmak and Sarigöz (2019), 61% of university students associated note-taking with listening activities, while the rest (31%) went for reading. This finding implies that listening comprehension for students is more challenging than reading, advocating the idea that note-taking is a significant strategy for enhancing listening comprehension.

1.8.2. Working Memory and Note-Taking in Immediate Listening

Baddeley and Hitch's Working Memory Model (1974, 2000) offers a clear overview of how working memory processes information along with its components that hold and process information during note-taking. These components are as follows.

The first component is the phonological loop, which is in charge of processing verbal data such as sounds. Besides note-taking, it shifts some of the auditory input into a written form, reducing the load on the phonological loop to enable learners to engage with the content. For instance, learners can document only key terms to release some space in the phonological loop for additional information.

Second, the Visuospatial Sketchpad, this component interprets visual and spatial information (e.g., images). Learners frequently encounter some visual aids and verbal input in their learning journey. Note-taking enables learners to organize visual and oral information and mix them in their notes. For example, a student may draw diagrams and charts based on oral illustrations, allowing more flexible and coherent learning.

Third, the central executive, the leader of working memory, prioritizes which information to focus on and which to ignore. In note-taking, this component manifests during real-time listening, chooses which speech section is significant, and organizes those notes effectively. Efficient note-taking involves selecting which information to include while the central executive filters out unnecessary data.

Episodic buffer is the most recent component, which integrates different resources from the other components (e.g., visuals, speech). Within real-time tasks, the episodic buffer enables linking visual information with spoken input, resulting in understandable content.

Note-taking helps learners control their cognitive load, allowing them to document their notes and not rely only on listening. This is helpful for EFL learners in understanding spoken language and recalling complex concepts. External storing of information empowers retention and comprehension. Moreover, writing also improves learning and academic

outcomes significantly; it aids comprehension by providing learners with amazing potential for identifying key terms and improving attention.

1.8.3. EFL learners' Difficulties during Traditional Note-Taking

EFL learners often neglect critical concepts and struggle with spelling rules or overall meaning because of the restricted capacity of the phonological loop, which keeps data for a while, even though they use his system to process English speech by using note-taking. Consequently, cognitive demand rises, making it hard to track the speech, especially if it is complex. Additionally, the multitasking of listening, understanding, paying attention to significant points, and documenting notes at once. This fact results in cognitive load even when the central executive manages the flow of information; thus, learners' quality of notes may decrease and become vague. If an EFL learner's focus is to record information without understanding the meaning or reflecting on prior knowledge, it results in a cognitive load on the central executive despite the role of the episodic buffer in incorporating multiple components. Finally, learners often feel demotivated and stop their writing process due to limited language proficiency, making them switch to their L1 as a sign of failure in comprehension.

Conclusion

The prior analysis presented discussed the cognitive foundation of listening comprehension in English as a foreign language learning, highlighting key academic theories. The chapter highlighted the working memory model by Baddeley and Hitch, which explained the mechanism through which learners manage and store oral speech temporarily. The stage of interpreting and comprehending spoken information was investigated in Goh's real-time listening model. Furthermore, Seller's cognitive load theory was introduced to highlight the need to balance cognitive demands throughout the listening process. Digital note-taking tools

with multimedia features create a smooth harmony in manipulating spoken input, especially for auditory learners. These tools can help reduce cognitive load along with reinforcing working memory. Moreover, the chapter concluded that these tools significantly support learners' listening comprehension skills and boost academic performance. While these tools are promising in teaching, insufficient exploration has been done on how EFL learners view and use multimedia-enhanced digital note-taking, specifically to enhance listening among learners. This gap in the literature draws attention to the investigation of EFL learners' attitudes toward and the pedagogical applications of digital note-taking tools in TEFL scenarios, learner-centered approaches that align both cognitive frameworks and e-learning techniques.

A decorative graphic of a scroll with a light gray background and a thin black border. The scroll is unrolled in the middle, with the top and bottom edges curving upwards at the ends. The text is centered within the unrolled portion.

Chapter Two

Digital Note-Taking to Boost Listening Comprehension

Introduction

Note-taking is a foundational academic skill that helps learners process and organize information. Traditionally, this process relied excessively on pen and paper. However, with the fast innovations in educational technology, note-taking strategies have witnessed radical changes, shifting from classical formats to interactive digital platforms. This evolution has introduced various tools and applications that enable them to record, edit, and revisit their notes in an easier and more interactive way. In today's digital era, digital note-taking has become a powerful technological tool that supports overall learning and caters to the cognitive needs of EFL learners. In this chapter digital note-taking is the focus matter where definitions and related theories are going to be discussed to understand how these tools function and assess their flexibility, incorporating digital tools within EFL learning frameworks is reinforced even more by cognitive learning theories such as the working memory model that explained how combining visual and verbal input can enhance retention and comprehension. Similarly, Sweller's CLT emphasizes the value of reducing cognitive load. According to Ahrens (2017), Forte (2018a), Kadavy (2021), and Marin et al. (2021), digital note-taking is the process of recording notes using technological devices like laptops or tablets through keyboard or voice notes, which differs from the traditional strategies of pen and paper that include notebooks. Therefore, as discussed in Pitura (2023), through the successful application of such tools, listening comprehension and overall academic performance are enhanced and also promote flexibility in capturing ideas and empowering learners' thinking process, leading to memory improvement. This study further explored how digital note-taking enables knowledge building and personal growth; it involves a set of procedures that reinforces knowledge management through recording and utilizing information successfully.

This approach enhances creativity and supports the application of knowledge in different contexts (Pitura, 2023).

2.1. Supporting Digital Note-Taking: Theoretical Framework

Various theories have been presented to explain the function of digital note-taking, among which multimedia learning theory and dual coding theory highlight the main principles of dealing with such devices and suggest solutions to correlate digital note-taking and listening comprehension. Additionally, these theories delve into details that explain how such tools are managed. Also, offering prominent solutions to overcome some challenges that may interfere.

2.2.1. Multimedia Learning Theory (Mayer, 2000)

Multimedia learning theory (MLT), introduced by Mayer in 2000, highlights how people learn effectively by combining relevant visual aids and words. Instead of relying completely on one single form of information, it highlights the key aspects of developing multimedia resources that correspond to cognitive operations to increase effective understanding and retention. Therefore, Mayer (2000) posits that “People learn more deeply from words and pictures than from words alone” (Mayer, 2000, Preface). This statement served as a stimulus for conducting the entire theory.

Multimedia learning and multimedia instruction are interrelated concepts, yet they are distinct. ML stands for learning through visuals and words, grounded in cognitive theories such as Dual Coding Theory and CLT, which emphasize that data is a combination of visual aids and words, accentuating the mental processes in learning. On the other hand, multimedia instructions are the actual application and representation of multimedia elements in educational settings. In other words, implementing multimedia tools in teaching and learning

depends on the delivery of media (e.g., computer screens) with verbal presentations such as words (Mayer, 2000, p. 3).

Multimedia instructions come in a basic format, which is a textbook lesson of printed documents and illustrations of images, and TV videos, which present both visuals and sounds. Another example is PowerPoint, which combines both computer slides projected onto a screen when explaining a given point. Spoken input along with visual representations from a comprehensive approach to conveying information effectively and efficiently (Mayer, 2000, pp. 4-5).

2.2.2. The Sensory Modality View

This view explores the importance to delivering data through distinct sensory inputs, including visual and auditory modalities offering a different knowledge processing. Integrating imagery (e.g., diagrams, videos) along with sound (e.g., speech, sounds) elements in instructions, for example, in a lecture the speaker's speech is operated in the auditory channel while slides are processed in the visual channel; as a result, information can be understood through different sensory means. This point minimizes cognitive overload on one sensory channel, boosting clarity and data retention.

The sensory modality perspective is learner-centred because it considers how learners process information. Sensory modalities correspond effectively with cognitive theories, including Dual Coding theory by Paivio and the Working Memory model, which considers having two distinct processing systems: the visuospatial and auditory processing. By engaging both systems, this approach reduces mental strain and improves the capacity of WM, strengthening comprehension and retention (Mayer, 2000, p. 6).

2.2.3. Dual-Coding Theory (Paivio, 1971)

Dual-coding theory, by Paivio in 1971, emphasized balancing visual and auditory input to the brain. As Clark and Paivio introduced DCT as a foundational framework for cognitive psychology, Paivio expanded upon the theory in the book called *Mental representations* and explained how imagery and verbal input support each other. While visual-spatial intelligence is concerned with processing visuals only, the verbal section tackles one's linguistic intelligence. Moreover, Paivio tested how people perceive the shape "roundness" by exposing pairs of subjects to objects such as tomatoes, and they were shown in distinct forms: word-word, in which objects were described linguistically; and picture-picture, which both were expressed through image, and word-picture pairing. Therefore, results revealed that participants reacted faster when objects were shown as pictures compared to words.

According to the dual-coding theory, combining both images and verbal representations empowers learning and recalling, since the brain interprets them differently. The dual processing improves overall understanding. Despite that some learners may feel overwhelmed regarding their drawings, the ultimate aim is to reinforce understanding rather than focusing on the artistic side. If learners succeed in identifying this distinction, they will benefit effectively of using their drawings as a means to comprehend complex notions; as a result, incorporating both systems can enhance teaching and learning, which in turn improve learners' understanding and reduces cognitive load (Arora & Giri, 2022, p. 5023).

2.3. Meta-cognitive Perspectives on Digital Note-Taking

Understanding how students process and control their learning is essential to ensure comprehensive learning atmosphere. Additionally, setting the focus on learners' centred approach serves as a helpful strategy to facilitate the process of learning. Which eventually

will result in learners' autonomy and their academic outcomes, and aid in catering different learning styles.

In the current era, Zhang, Hofmann, and Kamran (2024) argue that teachers must attain comprehensive technological skills, not only for their personal growth but also for impactful and meaningful learning atmospheres for their classes. Digital tools generally offer customized learning paths and provide opportunities such as interesting student-centred activities, enabling flexible access to educational content, and developing self-management skills in their studies. Additionally, an essential innovative technological application which facilitate SRL: instructional technologies such as online courses on self-regulated learning; therefore, teaching tools are designed to assist learners in improving self-regulated skills through structured guidance.

SRL can be enhanced through using AI tools which also can improve comprehension. Students than can control their academic progression and manage their studies effectively. Moreover, Somasundaram et al (2020) offers an AI program that was designed to support learners through interesting features that facilitates learning such as setting the learning goals and creating plans based on learners' preferences enabling automates learning experience. AI-based tools are useful in monitoring comprehension and reinforcing SRL in virtual educational settings, by assisting students in controlling their overall progress and managing their studies effectively. Additionally, as Roaa et al. (2018) developed an adaptive quiz application that offers a set of statistical questions that corresponds to learners' knowledge level. By a continuous analysis of their responses, this app ensures learners' engagement with the complex content, allowing them to adjust learning strategies as they develop and monitor understanding.

Overall, being aware of technological trends is a must, especially in the context of EFL learning. Digital note-taking offers a variety of benefits that help both teachers and students, such as promoting a collaborative learning environment and personal growth. Therefore, these tools boost self-regulated learning, which will result in learners' academic achievements and self-esteem.

2.4. Comparison of Digital vs. Traditional Note-Taking Methods

The shift from static handwritten notes to dynamic digital note systems has shifted the way students approach learning. Offering an insightful comparison between both methods, firstly by addressing the form of each. On the one hand, traditional note-taking requires documenting notes on paper or notebooks; the notes are disorganized, less accessible, and hard to locate; on the other hand, electronic notes involve recording notes through typing or digital ink, which enables easy access, is editable, and is stored in one application, as stated by Pitura (2023). Hence, digital note-taking can enhance learning by offering unique features, such as flexible storage, easy editing, and the ability to share notes efficiently, facilitating the retrieval of information and promoting collaborative work and a dynamic learning environment.

Plimmer (2008) highlighted that even though digital pen is effective in recognizing errors, and facilitating learning. Yet, system issues still manifest demonstrating a gap in their efficiency compared to the conventional methods. Additionally, users may feel overwhelmed with digital notes and cause a confusion since it is a recent trend compared to the traditional methods, also basic interaction with digital tools such as double-clicking may lead to technical errors which may hinder the learning process.

2.5. Common Digital Note-Taking Tools

Digital note-taking tools offer a variety of practices that facilitate the process, enabling learners to arrange and edit their notes, unlike conventional note-taking strategies. Understanding those practices is essential to assess learners' listening skills and overcoming the challenges that may occur.

2.5.1. Speech-to-text Transcription

Speech-to-text recording involves instant processing of oral language into a digital script. As highlighted by IBM's (International Business Machines) ViaScribe™¹ system, which is developed by IBM technological company. Transforming auditory input into written form in real-time. This system instantly converts a teacher's speech into text, which is displayed on laptops or screens through wireless connection. It incorporates a personalized user's profile to ensure accuracy, showcasing the role of technology in processing real-time transcription and accessibility (Taber-Doughty, n.d.).

2.5.2. Audio Recording

Audio recording such as synchronized learning content, happens by recording the professor's speech and stored digitally. When recording lectures learning become an interactive experience, algorithm-speech recognition features has gained significant attention particularly in educational context and medical care. Moreover, allowing real-time data processing can enhance learning and increase engagement, by giving learners the ability to revisit their lectures (Eftekhari, 2024).

2.5.3. Visual Mapping and Organizational Apps: Mind Maps and Tagging

¹ IBM's ViaScribe speech -to-text transcription tool designed to assist real-time processing.

Digital mind mappings, as discussed by Buzan (2012, as cited in Wangmo, 2022) are significant cognitive tools, which demonstrated their effectiveness in facilitating learning, organizing ideas, and creating interesting diagrams. Additionally, tagging also is considered successful in categorization of information; key words offer a clear discovery of data. In the technological era, tags aids in managing images by event or similar patterns. Overall, tagging allows efficient collaboration, improves organization, and offers a personalized experience (Voß, 2007).

Overall, digital note-taking tools offer a variety of benefits impeded with different application features such as speech transcription, audio recording, and visual aids which collectively contribute to improving listening comprehension and enhancing academic performance. Moreover, through careful usage of these applications learners then develop interesting learning strategies that contribute to overall comprehension skills.

2.6. Digital Note-Taking Strategies for Listening Comprehension.

Digital note-taking offers various strategies that enhance listening comprehension and facilitate the overall learning experience. These include structured techniques and multimedia elements. Clear and concise notes enable learners to perform effectively in a session and raise a deep awareness of the different strategies for improving listening comprehension that match their learning styles.

2.6.1. Structured Approach

Guided note-taking methods are referred to as an effective structured template that facilitates the process of organizing ideas and reinforcing active participation along with listening comprehension (Stapleton-Corcoran, 2023). This strategy provides a fixed formats of recording notes offering an organized way of documenting them, ultimately impacting

students' engagement and improving notes' quality. Moreover, structured notes enable flexible accessibility of notes through prepared set of slides that saves time and energy which enables convenient experience with such type of digital note-taking.

2.6.2. Integration of Text, Visuals, and Multimedia

Teachers are expected to master technology in the classroom to match the learners' capacities who are deeply immersed in technology and promote a dynamic learning atmosphere. Studies suggest using technological tools in leaning enhances learning experience compared to conventional methods. Therefore, by incorporating multimedia, students can develop significant listening skills through interactive content (Kır & Arıcı, 2024). The technology-driven approach is recommended in the context of EFL learning because it facilitates the language acquisition process. Furthermore, raising an awareness on such recent trends can elevate the teaching methods and make learning an interactive experience that aids learners.

2.7. Pedagogical Benefits of Digital Note-Taking

Electronic note-taking has a significant educational benefit, especially in reinforcing student's comprehension and auditory skills. Such devices play a significant role in enhancing the way auditory information is processed and memorized. Their flexibility to interact with auditory input and lectures makes it a priority for EFL learners compared to traditional methods, making the learning journey more dynamic and enjoyable. Integrating multimedia features, such as audio recordings and graphic- digital tools, facilitates understanding and creates a profound mental engagement.

Digital note-taking tools enhance the processing of instant listening by fostering active interaction with the material. This fact corresponds to Cognitive Load theory, which reduces

unnecessary cognitive efforts and allows learners to process spoken data at a manageable speed. Converting spoken auditory language into a written text reduces cognitive pressure on Working memory, especially in the phonological loop; this action facilitates immediate mental rehearsal and retrieval, incorporating text with graphics or aiding tools (e.g., mind maps), which aligns with Dual Coding Theory, improving comprehension through diverse means. Moreover, interactive engagement with the lecture, such as analyzing, considering, or linking ideas, aids the central executive in locating attention.

Electronic tools foster active engagement and motivation. They encourage dynamic interaction with visual and auditory content, using capabilities such as color highlighting, editing, and easy designs. Learners can perceive data in different forms, targeting distinct cognitive channels, as discussed in the Dual Coding Theory (Piavio, 1986). Additionally, multimedia tools increase understanding and engagement; these tools empower student autonomy, which is related to intrinsic motivation

Working memory is reinforced through the use of digital note-taking, by reducing cognitive overload during listening activities. According to the Working Memory Model, the central executive and the phonological loop reduce cognitive strains through visual aids and instant processing of oral input. Overall, digital note-taking tools can significantly boost listening and improve academic achievements if used wisely through clear instructions.

2.8. Challenges in Digital Note-Taking Implementation

Although digital note-taking presents various advantages, yet it involves a set of drawbacks. Among the potential limitations, there is distraction risks as it may be the major one along with over-reliance on technology which can reduce learners' engagement and their

critical thinking abilities turning them into passive learners. Moreover, it hinders students' creativity compared to traditional methods.

Mosleh, Baba, Malek, and Alhussein (2016) elaborate on how using digital devices for note-taking can lead to distractions such as social media, notifications, and unrelated applications, which may reduce students' focus and negatively affect their cognitive processing during lectures. As such, learners who use electronic devices during their lectures are more likely to get interrupted because of notifications or mobile application, which eventually reduces their mental capacities.

Moreover, the extensive dependence on technology has affected students' comprehension and retention negatively. Digital note-taking on smartphones particularly may lead to fragmented concentration and attention which, influencing their thinking skills due to these electronic devices. All these factors damaged the overall learning experience, proving that technology is a double-edged sword (Rubin & Adler, 2019).

Additionally, Olympiou, and Zacharia, (2012) further explained that teachers' strategies for structuring their lessons may not align with some digital note-taking features, for instance hands-on activities is one of the dominant strategies that most teachers prefer instead of virtual teaching strategies that it is common among learners. This factors, hence, serve as an obstacle to reducing students' engagement.

Usually, digital note-taking tools have complex designs that complicate their' usage, which can overwhelm the brain and also reduce attention and memory retention. Moreover, extensive cognitive strains can affect learners' performance and may consume time to perform such tasks such as editing (Mosleh et al., 2016).

Conclusion

With the growing attention to educational technology, it is necessary to explore EFL learners' perceptions and attitudes regarding digital note-taking tools. Drawing attention to their attitudes offers a profound insight into the familiarity, usage, engagement, and potential benefits in a learning context. Therefore, there remains a restricted study focusing on how such tools can improve EFL learners' listening comprehension. This chapter highlighted that realizing this connection can help enhance pedagogical strategies and integrate digital note-taking tools into listening tasks. Digital note-taking tools have effectively contributed to boosting EFL learners' listening comprehension, particularly during lecture listening, along with incorporating multimedia elements that facilitate the process from different angles, as discussed previously. Drawing on the Working memory framework, which explained how digital devices reduce cognitive burden, allowing learners to remain focused and engaged with the received input. Furthermore, digital note-taking offers several advantages, including flexible organization, convenient editing, and multimedia features, to fostering learning. However, obstacles still occur, such as technological issues and distraction risks; digital note-taking tools may overshadow the convenience method barriers. The efficient application of digital devices relies on the wise use of learners.

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Chapter Three

Data Presentation and Analysis

Introduction

This chapter provides a comprehensive overview of the research methodology used and the interpretation of the study results. It includes research method, research sample, and tools. The main focus is to present the study findings based on the data collected from a questionnaire addressed to Master One level ELT students at Ammar Thelidji University in Laghouat. The findings are presented after an investigation into EFL learners' attitudes toward digital note-taking and its impact on their listening comprehension. The significance of the research lies in the potential benefits of such tools in enhancing listening comprehension.

3.1. Study Design

This study used a descriptive quantitative research design, incorporating both quantitative and qualitative methods to gain a comprehensive insight into EFL learners' attitudes toward digital note-taking, improving their listening comprehension. A structured questionnaire was designed to gain numerical data out of close-ended questions, while the qualitative data were analyzed through thematic analysis to provide an in-depth understanding of EFL learners' experiences and views. Moreover, the combination of both methods allowed data triangulation, empowering the quality of findings and a profound interpretation of results.

3.1.1. Research Method

The research method refers to the structured plan used to investigate the research problem. This involved choosing appropriate methodologies, such as qualitative, quantitative, or a combination of both, which is known as mixed-methods research. In this study, the focus is on the descriptive quantitative approach, since it gives a more comprehensive understanding of the research topic, including statistical data along with detailed insights from participants' experiences. This method formulated the research questions and objectives and

outlined the entire research methodology used to test the research hypotheses and provide correct answers to the study.

A descriptive quantitative approach refers to combining both quantitative and qualitative processes within a single study, which is usually employed to gain a profound understanding of a complex phenomenon that cannot be analyzed using one single method. In effect, adopting a descriptive quantitative approach has gained attention in the field of education to investigate the relationship between variables while addressing potential issues for a given social group. (Creswell, 2009, pp.188-189). This method aligns with the purpose of the current study, which is to explore and investigate EFL learners' attitudes through describing a sample or a phenomenon. Also, it is frequently used when the researcher aims to identify characteristics, trends and categories. answering what, when, where and how questions.

The selected method serves as a guideline for processing data and conducting the analysis, which ultimately gives a systematic approach to the research process. Creswell (2009) states that a coherent methodology chapter promotes reliability, indicating consistency across research and highlighting that qualitative methods can be reliable and trustworthy. Additionally, there is validity, which focuses on the accuracy of results from the perspectives of researchers, participants, and readers, ensuring strategies such as triangulation. Therefore, this approach assures a better understanding of complex human and social behaviors. This chapter emphasizes the role of validity and reliability of the research outcomes.

3.1.2. Research Approach

The descriptive approach is a research plan that is designed to systematically overview a phenomenon, making sense of its elements and breaking it down so it can be measured and

compared, testing the research hypotheses. In the field of educational research, this model is found to be more effective for studying the integration of technologies, such as digital note-taking. Additionally, descriptive analysis allows researchers to systematically account and analyze events in the classroom, providing a broad perspective on how EFL learners perceive digital note-taking and examining its impact on their listening comprehension. This technique is beneficial because it combines qualitative observations with quantitative data, allowing us to clarify more deeply the potential benefits of digital note-taking in addition and investigating EFL learners' views and personal experiences.

3.1.3. Population and Sampling

The study's population included Master One students from the Department of English at Ammar Thelidji University of Laghouat, representing 57 students in the academic year 2024/2025. This group was chosen because they were required to be competent enough and mature to provide contrastive feedback, along with sufficient cognitive ability that qualifies them to engage with technology-enhanced learning.

Thirty-five Master One ELT students at the University of Laghouat were selected as the study target sample, majoring in the academic year 2024/2025. However, only 25 students were able to engage with the questionnaire. These students have been selected randomly as the sample without reference to their names. They were required to complete the respective questionnaire that would serve as a tool for data collection.

Choosing Master One students to work with was a conscious decision due mainly to the following reasons:

- They already had good background and considerable experience in language proficiency and actively engaged in listening tasks such as lectures.

- At this educational level, learners are more likely developed personal note-taking techniques, including electronic tools, which qualify them to be selected as a sample for this study.
- They are in a postgraduate mode which enables them to be aware of the cognitive processes involved in listening comprehension.

3.1.4. Data Method and Collection Tool

To investigate Master One ELT students' attitudes toward digital note-taking and its impact on their listening comprehension, the study utilized a mixed methods approach, and data was obtained through an online questionnaire that suited the study's objectives. The purpose of the questionnaire conducted was to explore EFL students' perceptions and preferences regarding digital note-taking and possible challenges encountered by EFL learners in processing oral input during lectures.

The questionnaire, the primary data collection tool, was designed to explore EFL learners' attitudes toward digital note-taking and its' impact on listening comprehension. Additionally, this specific instrument was selected due to its' effectiveness in handling large samples and efficiency in providing both quantitative and qualitative data through Google Forms charts and thematic analysis to assess open-ended questions. The questionnaire's structure, administration strategy, and method used are illustrated as follows.

3.1.5. Description of the Questionnaire

An online questionnaire was designed using Google Forms. It has been sent to thirty-five (25) Master One ELT students and includes 17 items that contain a mix of open-ended and closed-ended questions. While the open-ended items allow the respondents to answer freely using their own words, providing an in-depth understanding of ELT learners'

experiences and views, the closed-ended questions require them to choose an answer from a provided list of options, which provides measurable insights. The participants were assured that their answers would remain anonymous and confidential and would only be used for academic purposes that are of this study.

This questionnaire was divided into four sections. The first section targeted the familiarity and strategies in digital note-taking and involved five items:

- Two closed-ended questions, (yes /no) questions (Q1.3).
- Three multiple-choice questions (Q2/4/5).
- The second section aimed to investigate students' attitudes toward digital note-taking, as it contained a table of five Likert scale items (Strongly agree). Agree. Neutral. Disagree. Strongly disagree).
- Similarly to the third section that targets digital note-taking and listening comprehension in the form of a table that constitutes Likert scale item
- Finally, the last section was designed to explore personal insights of listening comprehension and digital note-taking in the form of two open-ended questions to gain a profound understanding of participants' personal views.
- At the bottom of the questionnaire, a designed area was provided to thank students for completing the survey.

This data collection tool was selected due to its effectiveness in gathering data and its ability to capture the personal preferences of participants. To ensure the validity and the reliability of the questionnaire, it was reviewed by three English language teachers; minor changes were pointed out in order to enhance the quality of the questions to align with the research objective. Master One ELT students were the suitable population for this study; the questionnaires were administered electronically.

3.1.6 Administration of The Questionnaire

The questionnaire was administered online through Google Forms, and the link is as follows: <https://docs.google.com/forms/d/e/1FAIpQLSfvCkqMP4SCkV3l0hBtd9BEHw2EFIwzimwOA-UUnueTiuLDng/viewform?usp=header> . Respondents were Master One ELT students who volunteered to participate in the survey with full awareness of their answers with a link shared via the Facebook platform with the help of a teacher. Data collection took over three weeks, and the analyses began directly after this phase. Therefore, participants were assured of the confidentiality of their responses, which would only be used for academic purposes along with a detailed explanation of the objectives and the purpose of the survey.

3.1.7. Pilot Study

A pilot study was conducted before administering the questionnaire to ensure its reliability and clarity of the survey. It includes five Master One ELT participants (two males and three females) at the English Department of Ammar Thelidji University in Laghouat. The participants were selected randomly to represent the entire sample of 35 participants; the questionnaire was distributed in print. Piloting a questionnaire refers to testing its content to confirm that the items are well-structured and comprehensive. The five students gave positive feedback regarding the simplicity of the chosen words, claiming that the questions were easily understood and straightforward. the questionnaire maintained its form without modification, which was a good sign of learners' competency and advanced experience. Conducting the pilot study was an essential step to ensure the reliability and validity of the survey, which aligns with the research objectives.

3.2. Questionnaire Analysis

The data obtained from the questionnaire were analyzed through Google Forms charts to analyze the quantitative data, while thematic analysis regarding the qualitative data. The analysis intended to identify general patterns to investigate EFL learners' perceptions towards digital note-taking. Yet, gender was not explored as a variable in the analysis since the research aim and objectives did not target gender differences.

Section One: The Familiarity and Strategies in Digital Note-Taking.

The first section was designed to investigate EFL learners' familiarity with such tools, also this it aimed to assess the strategies that learners adopt when using digital note-taking. Additionally, this section is an integral step to evaluate learners' background of such tools to ensure the reliability of the up-coming sections.

Question one: Are you familiar with digital note-taking?

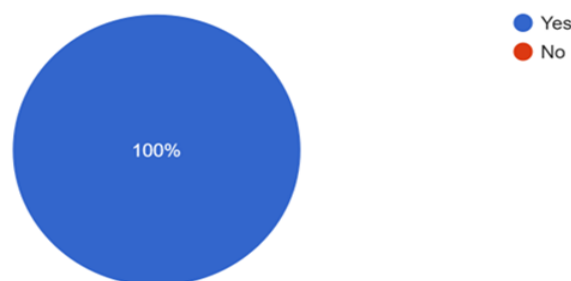


Figure 3.1: Relevance with Digital Note Taking.

The first question was designed to investigate EFL learners' familiarity with such tools. This figure displays the familiarity of ELT Master One learners with digital note-taking tools, results indicate that these tools are common among learners; this agreement highlights the importance of digital note-taking tools in the educational context as an assisting tool. Such

results align with the potential of incorporating such tools within the process of learning to enhance learners’ listening comprehension skills

Question Two: How often do you use digital note-taking (Smartphones, tablets, laptops) while studying?

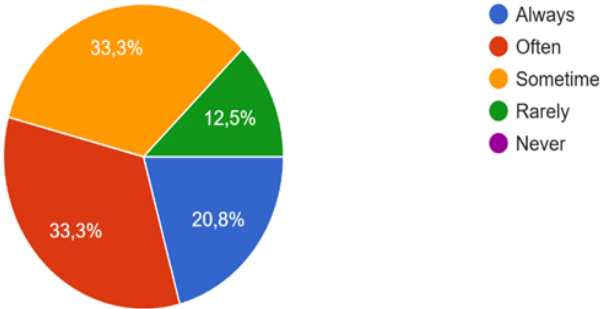


Figure 3.2: Digital Note-Taking Frequency.

The second question aimed to investigate the digital note-taking frequency to assess learners’ usage rate. As illustrated above, it shows that an equal percentage of 33.3% reported that the participants’ usage of digital note-taking tools ranges between ‘often’ and ‘sometimes’ suggesting a similar level of digital note-taking usage, which indicates that respondent’s interactions with these tools are good to some extent. 20.8% reported ‘always’, which represents their frequent use of these tools. Therefore, 12.5% scored the least among all options, which refers to ‘rarely’, as it serves as a significant response to learners’ views on such tools.

Question three: Have you ever used digital note-taking tools that incorporate multimedia features (voice recording, audio notes, diagrams)?

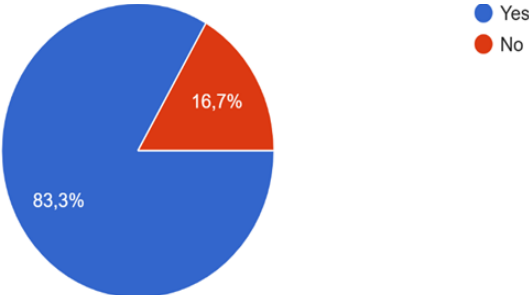


Figure 3.3: Digital Note-Taking.

The third question was designed to explore multimedia-enhanced elements within digital note-taking. Over 83.3% of respondents had already used digital note-taking tools that include multimedia features, reflecting a positive perception of such elements and the flexibility of such features in facilitating their overall learning. However, the remaining 16.7% of users have not yet used multimedia features.

Question Four: Which digital note-taking app have you used?

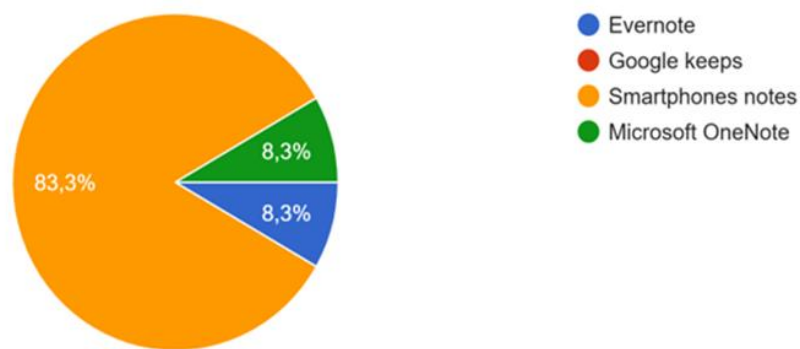


Figure 3.4: Digital Note-Taking Applications.

This question targeted different applications that users adopt when taking notes. This figure demonstrated that the majority of respondents (83.3%) use their smartphones to record their notes, indicating a convenient experience with the participants' smartphones as a part of our daily lives. A similar percentage of 8.3% reported using Microsoft OneNote and Evernote. However, Google Keeps was not selected at all, representing learners' unfamiliarity with such applications on smartphones.

Question Five: Do you like to integrate audio recording (lecture recordings, voice notes) while taking

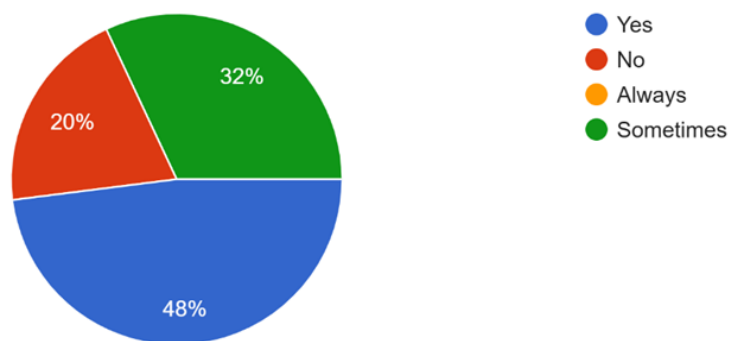


Figure 3.5: The Integration of Audio Recording During Listening

The fifth question intended to investigate EFL learners' preferences while taking notes. As can be seen in this chart, 48% of the respondents agreed on incorporating audio recording and finding it useful while taking notes. 32% of the respondents reported sometimes indicating a potential integration of such an element. However, 20% of participants didn't prefer using audio recording while taking notes, these responses indicate a diversity of opinions among learners.

The findings demonstrated positive attitudes toward digital note-taking. All respondents expressed an extreme familiarity with these tools, especially those who integrate multimedia elements. Additionally, data indicates that smartphone notes are the dominant app among ELT learners; also, many respondents preferred integrating audio recording while taking notes. Findings indicate positive feedback concerning EFL learners' familiarity with digital note-taking tools.

Section 2: Students' Attitudes toward Digital Note-taking.

The second section was designed to explore EFL learners' attitudes toward digital note-taking from different perspectives such as the flexibility, motivation, and convenience. Moreover, this section plays a crucial role in evaluating learners' personal views toward such tool, and track potential benefits of these tools to assess their impact on listening comprehension.

Statement One: I prefer digital note-taking due to its' flexibility compared to the traditional methods.

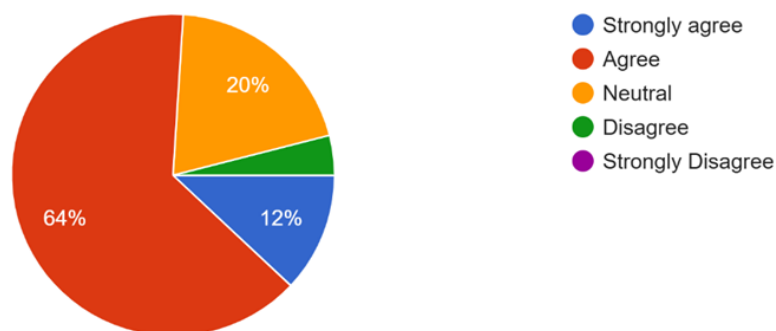


Figure 3.6: Digital Note-Taking VS Traditional Note-Taking.

This statement was designed in a form of a comparison between the two note-taking methods to extract learners' preferences. Most notably, 64% of respondents prefer digital note-taking due to its flexibility and effectiveness, unlike the traditional ones. However, 20% of participants were neutral, showing no clear opinion over their preferences. While 12% of people strongly agreed on the flexibility of digital note-taking tools. A small percentage, 4% of the respondents disagree and "strongly disagree" wasn't selected at all. This implies that digital note-taking can be perceived as an effective tool for some, yet still, not the best option for the rest.

Statement Two: Digital note-taking ensure my motivation unlike traditional methods (pen and paper).

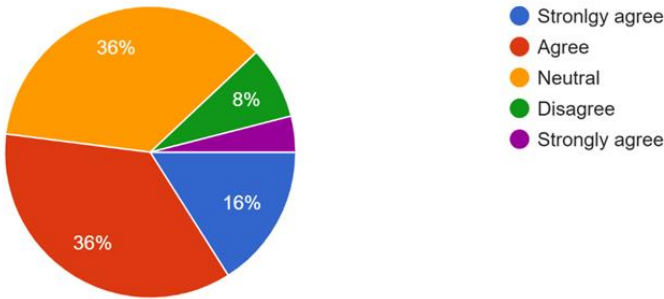


Figure 3.7: The Ability to Review Notes.

The second statement was designed to assess learners’ motivation when using digital devices compared to traditional methods. A mixed perception of participants’ views over the motivation that digital note-taking tools offer. As seen in the chart, an equal portion of respondents, representing 36%, selected “agree” and “neutral”. While some were certain and clear concerning their opinions, the others remained uncertain (3). 16% of learners strongly agreed with the statement, and 8% disagreed, while 4% strongly disagreed.

Statement Three: Taking notes digitally enables me to review them effectively.

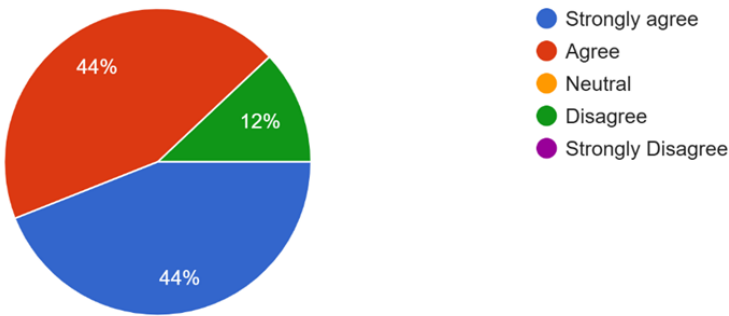


Figure 3.8: Digital Note-Taking Flexibility.

This statement discussed the possibility of reviewing notes to assess the flexibility of such tools. Nearly half of the participants, 44% selected both agree and disagree, showing a strong agreement on the convenient process of reviewing notes digitally. However, 12% of the respondents disagree, the options ‘strongly agree’ and ‘neutral’ weren’t selected at all. The results highlighted the effectiveness of digital note-taking in reviewing notes easily, unlike the traditional methods.

Question Four: I find digital notes more convenient since they permit me to edit my notes easily.

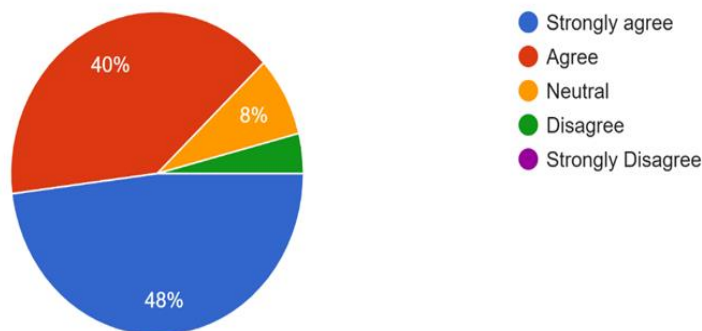


Figure 3.9: Memory Retention While Using Digital Note-Taking.

The fifth statement aimed to evaluate learners’ perception of the flexibility of digital note-taking particularly editing. Most participants, 48%, strongly agreed with the convenience of digital note-taking in editing notes. Additionally, 40 % of respondents reported ‘agree’, demonstrating positive feedback. While 8% of participants remained neutral and 4% disagreed, also ‘strongly disagree’ wasn’t selected by any participant. Results indicate a positive attitude toward the ease of these tools.

Statement Five: I tend to retain information when I listen to recording rather than reading my notes.

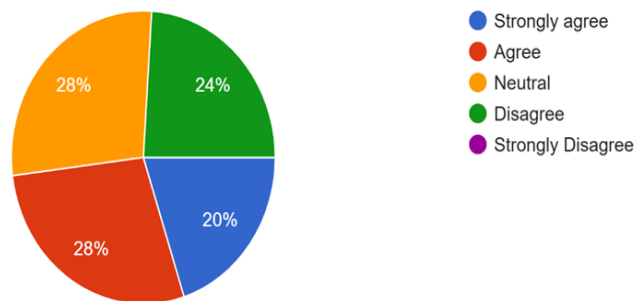


Figure 3.10: Digital Note-taking Challenges.

The primary aim of this statement was to explore learners' perceptions of recording notes. The percentages presented in the chart were closely related; respondents reported agreeing and being neutral equally, with 28% indicating that some participants took a stand toward retaining information through listening to their recordings, while some remained unclear. However, 24% strongly agree, and 20% selected 'agree'. None of the respondents strongly agreed.

This section aimed to investigate learners' attitudes towards digital note-taking, indicating a notable preference of using such tools due to their flexibility, while an equal split of students' views regarding motivation-building between agree and neutral, demonstrating a balanced division of their opinions. Moreover, several respondents agreed with the convenience and ease of using digital note-taking tools, while to the retention of information unbalanced views was received. Overall, digital note-taking earned positive feedback.

Section three: Digital Note-Taking and Listening Comprehension

The third section intended to make a correlation between listening comprehension and digital note-taking to gain comprehensive insights on the impact of digital note-taking on listening comprehension. Moreover, this section bridges the gap between the two aspects indicating benefits and possible challenges.

Statement One: I find it challenging to take notes and listen to lecture simultaneously?

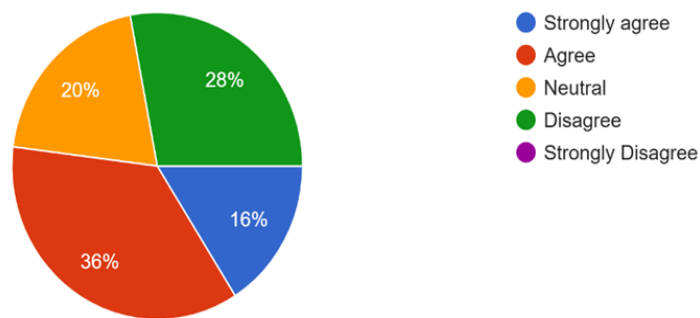


Figure 3.11: The Integration of Multimedia Features.

This statement aimed to extract the potential challenges when taking notes along with lecture listening. Thirty-six percent of participants find difficulties while listening to lectures at the same time recording notes. However, 28% opted for disagree and 20 % remained neutral. A few portion of students strongly agreed with the statement, indicating that most students suffer had difficulty in their note-taking especially when attending lectures.

Statement Two: Digital note-taking improve my ability to focus while listening.

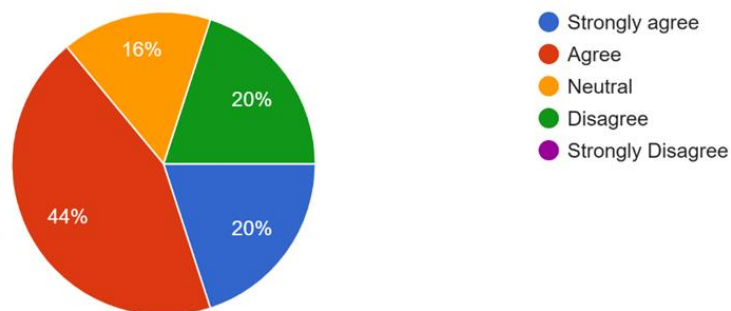


Figure 3.12: Fostering Concentration While Taking Notes Digitally.

The second statement aimed to investigate learners' perception of the concentration level that these tools offer. Three-quarters of 44% of respondents believe that digital note-taking improves their ability to focus while listening. Moreover, an equal percentage of 20% scored for both strongly agree and disagree. Still, 16% remain neutral, while those who strongly agree receive zero responses. Overall, the dominant responses suggest that digital note-taking enhances the learners' attention during listening tasks.

Statement Three: Incorporating multimedia features (audio notes, voice recording) enhances my recalling of spoken information.

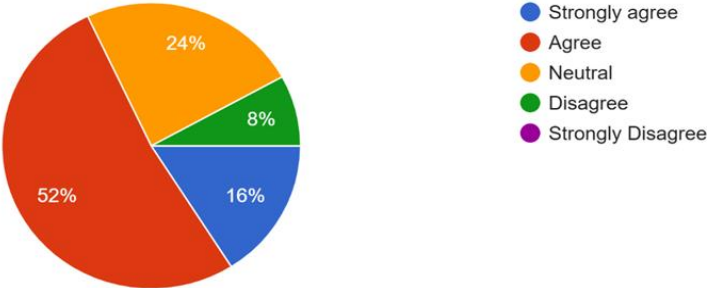


Figure 3.13: Multimedia Features Implementations to Boost Recalling.

This statement aimed to explore the impact of multimedia-enhanced features to boost recalling. Most notably, the majority 52% of participants think that incorporating multimedia features enhance their recalling of spoken input. while 24% didn't express a clear and direct opinion and 16% selected strongly agree, the remaining is a small percentage 8% disagree. No respondents selected strongly disagree. This implies that 86% of learners find multimedia feature effective and empowers their recalling skills.

Statement Four: I prefer recording lecture or using voice notes instead of writing while listening.

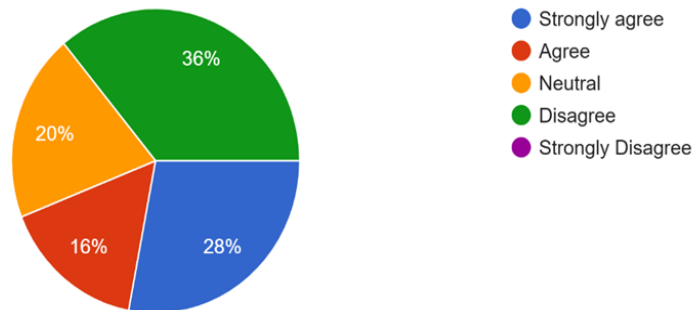


Figure 3.14: Learners' Perceptions on The Use of Voice Notes.

This statement highlighted learners' distinct views on documenting notes, it aimed at extracting possible benefits of voice notes. As can be viewed, many respondents claim that recording lectures while listening is not appropriate, and they prefer documenting them instead. 28% of participants agreed, indicating their preferences for using such assisting tools, and 20% neither agreed nor disagreed, while 16% intended to agree; the strongly agreed option was not selected. Question five: Listening to recorded lectures helps me to recall key points than reviewing written notes

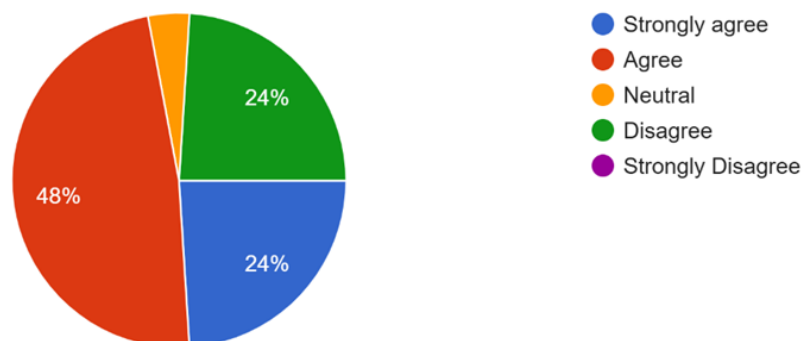


Figure 3.15: The Effectiveness of Recorded Notes Over Written Notes.

The last statement aimed to explore learners' perceptions of recording lectures and the conventional methods of taking notes. This diagram shows that 72% of EFL learners either strongly agree or agree that listening to recorded lectures helps to recall key points more than reviewing written notes, indicating a positive sign of the effectiveness of digital note-taking in ensuring the flexibility of reviewing notes anytime. Even so, 24% disagree, and 4% remain neutral, showing that some learners tend to prefer the traditional methods of note-taking.

This section aimed to explore the potential impact of these tools on listening comprehension, highlighting possible challenges such as maintaining concentration. Additionally, a high score of participants expressed the effectiveness of multimedia features. Also, recording lectures was a common activity among learners, indicating good interaction with these assisting tools for many reasons, such as the flexible process of reviewing notes and enhancing recalling skills.

Section Four: Personal Insights of Listening Comprehension and Digital Note-taking.

The last section aimed to explore learners' personal views of the actual impact of these tools and demonstrate the relationship between them. Students are then asked to provide answers that reflect their experiences to ensure the reliability of the answers and a space where learners can express their ideas freely. A thematic analysis was employed to identify the main themes within the data; each theme includes a set of examples extracted from the questionnaire.

Question One: From your point of view, how do digital note-taking tools influence your listening and your overall academic performance?

This question aims to explore learners' perceptions of the actual impact of these tools. Additionally, to investigate the influence of such tools on their academic performance.

Theme 1: Enhanced Concentration and Organization.

Many participants expressed that digital note-taking is beneficial when comes to maintaining focus and capturing information effectively, as it improves their critical thinking skills, especially during listening tasks. Ultimately, these tools received positive feedback in facilitating learning and improving overall academic performance.

Examples:

- *“For me, digital note-taking tools enhance my listening and comprehension by allowing for efficient and organized capture of information in real time this structured approach facilitates deeper understanding which improved academic performance.”*
- *“Digital note-taking tools help me focus better during listening by organizing information quickly, which improves my comprehension and supports better academic performance through easy review and clarity.”*
- *“The use of digital tools is really helpful which allows u to record lectures and organize notes easily, they help to focus better on lectures.”*
- *“I find digital note-taking helps me focus and remember key points better. It also boosts my performance by keeping my notes clear and organized.”*
- *“my point of view, digital note-taking tools can significantly enhance listening comprehension and overall academic performance when used effectively in order to improve organization, enhance concentration and focus during the lesson.”*

Theme 2: Academic Improvement.

Respondents linked digital note-taking to academic success, emphasizing the memory retention improvement and flexible reviewing of content. Moreover, participants highlighted the roles of multimedia features in facilitating the process of editing and reviewing notes effectively, which increases their creativity.

Examples:

- *“From my point of view digital note-taking tools influence my listening comprehension and my overall academic performance in a way that is helpful for reviewing later, this makes studying way more efficient and helps me understand the module better.”*
- *“I think digital and multimedia tools enhance my focus when you are trying to listen and take notes in same time and enhance also my understanding and memory which can affect the academic performance as students.”*
- *“Digital note-taking influence listening comprehension and academic performance in a way it allows to capture details, promote critical thinking in addition to developing language related skills enhancing academic performance eventually.”*
- *“they can simplify the studying process and help us understand lectures in an effective way”.*
- *“digital tools such as voice recordings or apps that transcribe lectures can be very useful later on. They allow me to review all the important points that I might miss or forgot which can improve my academic performance by helping me study more effectively after class.”*
- *“Digital note taking tools can significantly improve listening comprehension and overall academic performance in few ways:*
 - *“1/ better focus and organization”*
 - *“2/faster note taking”*
 - *“3/ easy review and search”*
 - *“4/less paper, more flexibility.”*

Theme 3: Conditional Effectiveness and User Techniques.

Several participants focused on the appropriate strategies for digital note-taking. For instance, if learners emphasized applying techniques such as summarizing, these tools are significant and useful. However, if used passively with distraction risks, these tools can harm the overall performance.

Examples:

- *“For me it depends on how we use them like if we use them the right way by writing down the essential ideas with our own style, staying focused, and utilizing highlights or recording features they can simplify the studying process and help us understand lectures in an effective way, but if we just type everything without concentrating or if we get distracted we won't really understand or remember much.”*
- *“Digital note taking tools can enhance listening comprehensive when used to support active listening and later review, but may hinder it if they cause distraction or shallow engagement”*
- *“So basically, sometimes it works sometimes it doesn't”*

Theme 4: Distraction and Over-dependence on Technology

The negative impact of digital note-taking tools was highlighted; some respondents claim that these tools can reduce attentive listening and active engagement with the content, in addition to the over-reliance on features like auto-correction and recording may involve negative outcomes.

Examples:

- *“Reduce active listening and lower information retention”*
- *“Digital note-taking tools have a negative influence on my listening skills. For instance, in a lecture I wouldn't mind missing some terms for I would be relying on my phone, knowing that it would capture each word that was said during the lecture.”*
- *“In my experience, digital note-taking tools may have both negative and positive effect. Personally, I find them less effective for listening comprehension like typing during lectures because focusing on typing or organizing notes can distract me from fully understanding what the teacher is saying.”*

Question Two: To what extent do multimedia tools (videos, visuals, voice notes..) contribute to your understanding and retention of information?

This question is an attempt to understand the potential benefits of multimedia-enhance features particularly to boost listening comprehension. Moreover, to assess the how these tools contribute to learners' overall understanding and recalling of information.

Theme 1: Improved Comprehension and Retention.

A significant number of participants demonstrated positive feedback of multimedia tool functions, such as visual and auditory assistance, which makes complicated concepts clear and comprehensible, improves memory retention, and enhances academic achievements.

Examples:

- *“They contribute by facilitating complex Concepts and providing mind maps, schemes for easier information retrieval.”*
- *“They can significantly improve my understanding and making the information more memorable”*
- *“it contribute greatly to understanding and retention of information by engaging multiple senses and making abstract concepts more concrete.”*
- *“I understand and remember things more easily with videos, visuals, and voice notes.”*
- *“Multimedia tools like videos and voice notes are helpful for understanding and retaining information. They make learning more engaging and cater to different learning styles. Visuals help you grasp concepts, while voice notes are great for active recall.”*
- *“Multimedia tools like videos, visuals, and voice notes can greatly improve understanding and retention of information. They make learning more engaging by combining images, sound, and text, which helps you remember concepts better. These tools also break down complex ideas into simpler forms, making them easier to grasp. Plus, seeing and hearing information in different ways can reinforce your memory, making it stick longer.”*
- *“Multimedia tools contribute my understanding by helping me learn easily and better because they make things simple to grasp the ideas or the information that I'm in need to remember.”*

- *“Digital is vital means that play crucial role in shaping and guiding my understanding, they contribute critically to understand information, throughout songs, pictures and through repetition wherever I locate”*

Theme 2: Visual and Auditory Learning Styles Preferences

A notable number of participants highlighted their preferred learning style, indicating the effectiveness of visual aids such as diagrams and videos, also auditory aids like voice notes and recordings. Therefore, digital note-taking caters to many learning styles which elevates learners’ academic achievements. Moreover, they expressed their satisfaction with these tools in maintain personal and academic flow.

Examples:

- *I find it very helpful and I would definitely like to use videos and visuals to understand because sometimes it is hard for me to grasp information but since I’m a visual person this would make easier for me.*
- *you can remember a picture that you seen it before so you can easily remember the information or how to pronounce it*
- *Visuals help you grasp concepts, while voice notes are great for active recall.*

Theme 3: Conditional Effectiveness and Students’ Strategies

Three respondents reported that the effectiveness and significance of multimedia tools depends on the learners’ usage techniques, that is to say they function the best when paired with active and dynamic engagement. Yet, it is not consistently used.

Examples:

- *“Basically it helps me remember information clearly and retrieve understanding, but I don't use it much. “*
- *“There effectiveness depends on how they are used. They help in engaging and motivating also help in enhancing comprehension.”*
- *“It helps to an extent but not all time sometimes I loose focus or get bored.”*

Theme 4: Distraction Risks and Reduced Attention

Two learners noted difficulties with multimedia features such as distraction and decreased focus while performing tasks. Additionally, they preferred the traditional methods over technology.

Examples:

- *“They distract me and break my focus.”*
- *“For me, since I don't prefer digital note-taking, I don't find it really effective on my comprehension because I can easily understand from the teacher's explanation directly. But in a way, it may be helpful if it is voice records because it includes all the points that are mentioned in the class to be checked later on.”*
- *“Actually not that much, most of the time I prefer to go back to the written notes rather than the videos or the voice notes because they are not always useful and helpful for me.”*

Theme 5: Multimedia as a Review Tool

Some participants expressed their satisfaction with multimedia elements, especially praising auditory aids such as recordings of lectures and assisting videos, which initially enhance their recalling of information. Moreover, students highlighted the effectiveness of such elements in creating interesting format.

Examples:

- *“It helps me remember and listen to every word that was mentioned during the lecture.”*
- *“It may be helpful if it is voice records because it includes all the points that are mentioned in the class to be checked later on.”*
- *“The use of multimedia tools helps a lot in creating an interesting and memorable lecture.”*

The last section was designed to explore personal perceptions of ELT learners concerning the effectiveness of digital note-taking in enhancing listening comprehension; in

addition to the role of multimedia features that empower overall academic performance, data revealed diversity with their views leaning towards a positive attitude. Yet, there are some participants who showed a negative influence of such tools, indicating their personal preferences for the traditional note-taking methods.

Overall, the findings of this study imply positive feedback on EFL learners' perceptions of digital note-taking and its impact on listening comprehension. Moreover, the first section of data analysis tackled quantitative data, which demonstrated high satisfaction with such tools, indicating the effectiveness of digital note-taking in boosting listening comprehension. Furthermore, qualitative data offered a comprehensive insight into learners' perceptions, which expressed the efficiency of multimedia-enhanced features to enhance memory retention and listening. Therefore, the research's findings highlighted the role of digital note-taking in empowering listening comprehension and improving the overall academic performance of EFL learners. Additionally, findings align with the research objectives and support the initial hypothesis, which suggests a positive perception of digital note-taking tools.

3.3. Ethical Considerations

Ethical considerations take on great importance as researchers interact with individuals. Thus, it is necessary to ensure ethical principles throughout the research process. Initially, obtaining administrative clearance and guidance from the Head of the English Department at University of Laghouat. Also, all participants gave their consent to participate in the study. In addition, confidentiality was guaranteed to the participants, and their identities and responses were protected and kept anonymous, exclusively for research.

3.4. Limitations of the Study

Given that, the findings of this study provide an in-depth understanding of EFL learners' attitudes towards digital note-taking and its impact on their listening comprehension. On the other hand, the research is limited by certain factors that may influence the consistency and the scope of the study. These limitations include the small sample. This study intended to target 35 participants. However, 25 respondents were obtained due to circumstances such as learners' limited availability and schedule planning issues. Despite that, 25 participants were still sufficient to gain comprehensive feedback and significant insights that aligned with the research objectives.

3.5. Recommendations

As with any research study, there is always room for improvement; the researcher provides the following set of suggestions and recommendations that can help explore pedagogical training in digital note-taking and whether promoting explicit training can enhance learners' overall comprehension and active engagement. Additionally, investigating students' learning styles and personal preferences is an interesting scope that should be covered to gain insightful feedback and overcome potential issues to strengthen their productivity and enhance academic outcomes.

Conclusion

This chapter tackled the applied research design and methods employed to explore EFL learners' attitudes towards digital note-taking and its impact on their listening comprehension. It encompasses the research methodology, involving data collection tools, identification, administration, and data collection. Additionally, it provides a comprehensive description of the population's perceptions. The chapter presented a detailed description of the

study instrument, which is a questionnaire representing the mixed-methods approach discipline, incorporating both quantitative and qualitative methods for data collection to gather students' perceptions. In summary, the chapter outlines the data analysis procedure utilizing the Google Forms charts. This includes 25 Master One ELT participants for quantitative data analysis and thematic analysis for qualitative data, in addition to highlighting the study's validity and reliability to ensure the research's quality. Moreover, digital note-taking tools have a significant impact on learners' listening comprehension and academic performance, with the recognition of drawbacks and advantages associated with these tools, yet learners still function effectively. Finally, the chapter concludes by presenting ethical considerations, such as obtaining administrative guidance for conducting research and students' consent to participate while ensuring confidentiality for learners.

A decorative graphic of a scroll with a light gray border and rounded corners. The scroll is partially unrolled, with the top and bottom edges curving upwards. The text is centered within the scroll.

General Conclusion

This thesis aims to explore EFL learners' attitudes toward digital note-taking and its impact on their listening comprehension. The primary objectives were to evaluate the impact of digital note-taking tools on overall academic achievement and to compare the effectiveness of digital notes with the traditional method. This work adds value in the sense that it can lead to a profound understanding of EFL learners' preferences and views, along with the potential implementation of digital note-taking tools within educational settings as an assisting process for both educators and learners.

The first chapter delves into a theoretical foundation of listening comprehension with a review of literature that contributed to the establishment of a comprehensive foundation for this educational tool. The first chapter explores definitions and a set of theories. In addition to the potential drawbacks of traditional note-taking, which serves as a transitional bridge to the second chapter and shifts attention toward digital note-taking, examining the cognitive processes that encompass while using such tools moreover, solid theories were introduced as a base for the entire research, this chapter concludes by different digital note-taking strategies and applications.

The last chapter was dedicated to the practical side of the thesis. It discussed and analyzed data through Google Forms charts and thematic analysis, using both qualitative and quantitative methods. Findings indicated positive attitudes towards digital note-taking and provided a positive influence on EFL learners' listening comprehension. Moreover, this research would contribute meaningfully to investigating the perception of EFL learners. Using a descriptive quantitative design to examine the qualitative and quantitative data more thoroughly. It allowed us to understand how digital note-taking can be successfully integrated into educational settings. This highlights the potential of adopting such tools to assist learners in better learning outcomes. Therefore, results support all the hypotheses that suggest using

General conclusion

digital note-taking profoundly enhances EFL learners' listening abilities along with multimedia integration that strengthens auditory learning. Additionally, research questions were answered through data analysis, which indicated that EFL learners preferred digital note-taking over conventional methods; also, learners expressed their satisfaction clearly with the open-ended questions, particularly those with multimedia features and their function in improving lecture listening.



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Appendices

Google Forms Questionnaire

Questions Réponses 25 Paramètres

Section 1 sur 4

Questionnaire on EFL Learners' Attitudes Towards Digital Note-Taking and its Impact on Listening Comprehension"

B *I* U  

Dear students,
You are invited to participate in our research study entitled:" EFL Learners Attitudes Toward Digital Note-Taking and its Impact on Listening Comprehension". This study aims to explore the listening skills of English as a Foreign Language (EFL) learners by examining your preferences, perceptions, and attitudes towards digital note-taking methods, as well as your views on listening comprehension in the context of EFL learning. Your responses will remain confidential and will be used solely for academic research purposes.

familiarity and strategies in digital note-taking
Description (facultative)

1. Are you familiar with digital note-taking tools?

Yes

No

2. How often do you use digital note-taking (smart phones, tablets, laptops) while studying?

Always

Often

Sometime

Rarely

Never

3. Have you ever used digital note-taking tools that incorporate multimedia features (voice recording, audio notes, diagrams)? *

- Yes
- No

4. Which digital note-taking apps have you used?



Choix multiples

- Evernote X
- Google keeps X
- Smartphones notes X
- Microsoft OneNote X

5. Do you like to integrate audio recordings (lecture recordings, voice notes) while taking notes? *

- Yes
- No
- Always
- Sometimes

Après la section 1 Passer à la section suivante

Section 2 sur 4

Section 2: Students' Attitudes toward digital note-taking



kindly review each statement below and tick (✓) the option that reflect your perspective.

6.I prefer digital note-taking due to its flexibility compared to the traditional methods

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

7.Digital notes ensure my motivation unlike traditional methods (pen and paper)

- Strongly agree
- Agree

8.Taking notes digitally enables me to review them effectively.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

9.I find digital notes more convenient since they permit me to edit my notes easily.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

10. I tend to retain information when I listen to recording rather than reading my notes.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Section 3 sur 4

Section 3: Digital note-taking & listening Comprehension



Description (facultative)

11. Do you find it challenging taking notes and listen to lecture simultaneously?

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

12. Digital note-taking improve my ability to focus while listening

- Strongly agree
- Agree
- Neutral
- Disagree

13. Incorporating multimedia features (audio notes, voice recording) enhances my recalling of spoken information.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

14. I prefer recording lecture or using voice notes instead of writing while listening.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

*

15. Listening to recorded lectures helps me to recall key points effectively than reviewing written notes.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Section 4 sur 4

Section 4: Personal insight of listening comprehension & digital note-taking



Description (facultative)

16. From your point of view, how do digital note-taking tools influence your listening *
comprehension and your overall academic performance?

Réponse longue

17. To what extent do multimedia tools (videos, visuals, voice notes..) contribute to your *
understanding and retention of information?

Réponse longue

Thank you for your participation.

Description (facultative)