BENEMÉRITA UNIVERSIDAD AUTÓNOMA DE PUEBLA

Facultad de Lenguas

USING DUOLINGO TO PROMOTE VOCABULARY

A thesis submitted to the Faculty of Languages for the Degree of
Licenciatura en la Enseñanza del Inglés

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This investigation has been read by the members of the Committee of

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And is considered worthy of approval in partial fulfillment of the requirements for the degree of

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Dedications

To my mother, who always supported me, I will always have you in my mind.

To my partner who is always there for me, I hope to make you proud.

To my sisters, who always watch over me, I wish you the best.

ABSTRACT

The increasing use of technology led to the creation of this thesis project, which investigated the impact Duolingo has on vocabulary promotion for students from Facultad de Lenguas. Forty students volunteered to participate in a study that asked them to use Duolingo for four months. They would need to spend from six to eight hours weekly on the app to learn English. Then, they were provided with a questionnaire at the end of the project to share their perceptions about Duolingo, and their answers were discussed in detail in this work. This work aims to know if Duolingo promotes vocabulary learning and, if so, how it contributes to English language learning.

Content

CHAPTER I: INTRODUCTION TO THE PROBLEM

1.1 Introduction

It is no secret that technology is here to stay. Far away remain those days when humans could not connect or did not use technology to facilitate even the simplest things. Since its origins, humans have accomplished various achievements in several fields that never stop to amaze us and will keep on doing so. It is impressive how far we are from our first stone tools to our most recent groundbreaking and cutting-edge technology.

More people are using Information and Communications Technologies (ICTs) in multiple daily activities such as work, education, business, and others. The education field is no exception to this progress, and it is influenced by technology. In this research project, ICTs will be selected as a reference for technology within the educational field. They have become a popular subject among researchers due to their straightforward access and constant innovation directly tied to the technology itself. The number of schools investing in ICTs is increasing exponentially, adapting them for educational purposes and giving them the potential to enhance education (Oxford Business Group, 2019). Therefore, the constant development of technology and the Internet in the 21st century has changed the way things are done in education, influencing the way educators teach and students learn. Today, one of the most prominent trends that teachers are adopting is the use of ICTs in the classroom.

To begin with, a worldwide familiar institution such as UNESCO agrees that ICTs are beneficial tools that enhance the teaching and learning processes and facilitate equity and access to education. Also, given the right circumstances and policies, ICTs might as well upgrade education administration and management (UNESCO Institute for Statistics, 2023). In addition, The World Bank Group (WBG) is very specific about the use of ICTs in education, stating that they can provide new opportunities to support teachers and students in the language acquisition process. Part of their work related to education is collaborating with governments and organizations worldwide to support innovative projects and research, as well as sharing the appropriate use of ICTs in education to strengthen the learning process, bearing in mind their focus on global poverty and its extinction (World Bank, 2018). The potential of ICTs in education is crucial since they allow students to learn digital skills necessary for our society at their own pace. Nevertheless, more evidence is needed to understand better how software and hardware tools can enhance the learning process and help students develop the

necessary skills they will need in the future.

Furthermore, Secretaría de Educación Pública (SEP) is also interested in having ICTs promoted in education, having its dedicated website to ICTs called Learning to Learn with ICTs, a project designed to help students, teachers, parents, and other members of the educative community to strengthen the use of ICTs to stimulate lifelong learning (SEP, 2015). Then, it is ordinary to see school classrooms equipped with ICTs. Within our university, televisions, projectors, virtual classrooms, whiteboards, network connections, flat screens, computer equipment, video and DVD players, and boomboxes, among others. Also, teachers are constantly encouraged to use ICTs in their classes. Therefore, when students are requested to evaluate their teachers, they are asked to evaluate their teachers' use of ICTs during their imparted courses. Additionally, there is the auto-access center (CAA), an English-learning environment with the material, tools, coaching, and equipment designed to enhance students' autonomy and language skills. This learning tool is essential for autonomous students, and it is one of the resources BUAP must offer to students (Facultad de Lenguas, 2023).

Finally, the English Teaching Bachelor at the Faculty of Languages classifies the Development of Skills in ICTs as one of the five cross-cutting pillars. The mission of the major is the training of novice teachers with knowledge of technology to promote the learning of English in different modalities, contexts, levels, and training environments. The BA in English Language Teaching is structured under the guidelines of the MUM, which incorporated new educational trends at that time. Although it is a face-to-face program, novice teachers must be able to partially use and promote technology as non-face-to-face education in virtual spaces and distance programs (Téllez, 2009).

1.2 Research setting

There are 126,577,691 inhabitants in Mexico (Secretaría de Gobernación, 2019), of which 98.6 million have access to the Internet (Laricchia, 2023) and, almost the same amount, there are 98.54 smartphone users (Statista Research Department, 2023). The increasing number of

people with access to this technology suggests that a new approach is necessary for both technological and educational fields. The syllabus needs improvement so students can appropriate knowledge (Flores-González, 2020) through the same technology. In Mexico, some challenges remain and need to be kept up with technology and fully take advantage of it:

a) Expansion of telecommunication infrastructure to assure equal access to education among students.

b) Integration of the Internet in the educational system.

c) Development of platforms that provide meaningful learning.

d) Investment in new information and communication technologies (Juárez, 2015).

Despite all the possible benefits technology can bring into educational spaces, its inclusion will not create the conditions to promote autonomous learning. Therefore, school practices remain almost the same, with some teachers claiming to have fully incorporated ICTs into the curriculum when they may not use and promote them properly, affecting their skill development in ICTs and the professional profile stated in the school syllabus.

1.3 Aims of the study

The number of smartphones is constantly increasing. Indeed, as of November 2022, 6.598 billion smartphone mobile network subscriptions were reported worldwide (Holst, 2022), of which 84.4 million are in Mexico (Statista Research Department, 2023). It means that smartphones have a penetration rate of 61.5% in Mexico (Laricchia, 2023). This arousal in numbers led to applications dedicated to language learning like Duolingo, Busuu, Babbel, Memrise, HelloTalk, and HiNative, among others. Some mainly focus on language courses, and others are dedicated to games, chat, and social features that might promote language learning (Lingualift, 2023).

In 2012, Vesselinov and Grego conducted research to test Duolingo's efficiency. They reunited 88 participants instructed to use Duolingo as a tool to learn Spanish as a foreign language for eight weeks. The participants were people from the U.S. who did not know the

language and Spanish students with basic Spanish knowledge. Results suggested that a person would need an average of 36 hours to cover the material of an introductory Spanish semester (Vesselinov & Grego, 2012). This initial Duolingo research paved the way for further studies about language learning apps and their influence on students' learning processes. Nonetheless, research within this field has not been extensive, especially in the use of language learning applications in language acquisition; therefore, the purpose of this study is to delve deeper into the matter and evaluate if Duolingo promotes English language learning, specifically vocabulary learning and how.

1.4 Research questions

- Does Duolingo promote vocabulary learning?
- How does Duolingo contribute to English language learning?

1.5 Justification

The increasing number of people acquiring smartphones, as well as the accelerated development of technology, led to the creation of this research project, whose purpose is to know the efficiency of Duolingo for language and vocabulary learning. The findings of this study will generate information regarding Information and Communication Technologies and platforms for language learning since their efficient use in the classroom enhances the quality of education required by the BA in English Language Teaching. Additionally, the latest trend to digitalize as much information and procedures as possible due to the recent COVID-19 pandemic should concern educators and researchers regarding the future of education and the opportunities to learn languages from home.

1.6 Key terms

ICTs. The UNESCO Institute for Statistics (UIS) defines ICTs as technological tools and

resources to create, store, share, promote, and manage information. These technologies include computers, the Internet, broadcasting technologies (radio and television), and telephony (UNESCO Institute for Statistics, 2023). In addition, the Cambridge Dictionary states that ICTs stands for information and communication technologies, a term that lately has been used to name a school subject in which students manage and operate computers and electronic equipment to save and forward information (Cambridge University Press, 2023).

Teaching. Several definitions from dictionaries indicate that teaching is the occupation of a teacher that usually takes place in formal contexts, while to teach is the act of passing on knowledge to someone to accomplish something; however, that assumption would imply that all of us are teachers to some degree at some time of our lives, so what does teaching involve? According to Smith (2016), teaching is a tracking down process and intervening in people's needs, experiences, and emotions to help them learn things.

Learning. It is the act of obtaining knowledge. Here, learning would mean a permanent modification in somebody's detectable performance linked to learners' past, which usually refers to a single retained event or repeated experiences (Gross, 2010).

Vocabulary. This word has two slight differences. It is the set of words learned and operated by a person, although it also represents all the words that a specific language or subject has acquired (Cambridge University Press, 2023).

Duolingo. A free language-learning platform based on language methodologies and curricula. Its main target is to offer accessible and fun language education to its more than 300 million users (Duolingo, 2022a).

1.7 Conclusion

The increasing development of technology has influenced several aspects of human lives. Education was no exception to those changes and has rapidly adopted many of its tools to improve the quality of education and to keep up with the increasing demand for technology.

The introduction of ICTs in the educational field is for teachers and students in many aspects; nonetheless, they need to be constantly regulated and evaluated by educators and researchers due to their changing nature. Initially, this project explored the possibilities and advantages ICTs provide to education. However, findings regarding the use of mobile applications to learn languages and their effectiveness were constantly found and narrowed the investigation to this recent study. Consequently, the following research will focus on how Duolingo helps students to learn English as a foreign language, specifically vocabulary, and to what extent it contributes to English language learning.

CHAPTER II: LITERATURE REVIEW

2.1 Introduction

The English language has undoubtedly become one of the most important and studied languages in the world. There are approximately more than 1.35 billion English speakers, of which 360 million are native speakers (Lyons, 2021). Not only the English language has become very popular, but technology and the Internet have also because of their appearance due to their promising potential in education, both formal and informal. As a result, educational institutions try to renew their methodologies and curricula to implement technology in education, leading to new abilities and skills that are now considered necessary in our current society and reinforced by students and educators.

The purpose of this chapter is to present literature that supports the use of technology in education and make a proposal regarding the acquisition of the English language through technology, specifically Duolingo, a platform designed for online language learning. The benefits of using ICTs in education properly will be further discussed in detail to support this research project and the context of the study.

2.2 ICTs in Education

Information and communication technologies are “a diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information” (Blurton, 1999, p. 1). Thus, the Internet, radio, television, computers, and telephony are examples of these technologies (Tinio, 2003).

At the beginning of 2021, there were 4.900 billion active Internet users, and 65.6% of the households in the world had access to it (Ying, 2021); an approximation of 63.6% of the content is in English (Web Technology Surveys, 2021). Most of the users are from Asia (53.4%), and people from Latin America and the Caribbean are experiencing a significant increase in penetration of the Internet (75.6%), being only behind Europe (88.2%) and North

America (93.9%). All Internet users in the world (5,168,780,607) represent more than half of the world's population (7,875,765,587), or at least until last year (Miniwatts Marketing Group, 2021).

Nowadays, ICTs and education have an interdependent relationship because they have the potential to improve formal and informal education by making it "more flexible, fluid and … more empowering for the individual learner" (Selwyn, 2012, p. 8) if used by educators that know how to reach their full potential (Ogilvy, 2006). They are also less expensive than they used to be, facilitating access to them (Ahmed, 2016). Teachers must recognize computers "not simply as information machines but also as a new medium for creative design and expression" (Underwood, 2014, p. 6).

Teaching with technology is often a complicated task because of the challenges that imply new technologies, both analog and digital, synchronous and asynchronous. Although technologies highlight their specificity, stability, and transparency of function, they become obsolete over time by modern technologies. Digital technologies, on the other hand, are versatile, unstable, and opaque in inner workings hidden from users, making it difficult for teachers to adapt them to their curricula (Harris et al., 2009).

Also, specific technologies have their very own potentials and restrictions that make them more adequate to fulfill some assignments better than others; therefore, teachers who obtained their school degrees when technology was not as advanced as it is today often have difficulties using digital technologies for teaching and learning purposes (Flores-González, 2022) or even at all because they feel unprepared for using technology and may not appreciate its true hidden potential.

For instance, the SITES Module 2 is a qualitative study that explores "the relationship between ICT use and innovative pedagogical practices in classrooms" (Kozma, 2003, p. 9), exploring 174 case studies from 28 countries to demonstrate that ICTs seemed to have a positive effect on students and teachers: they improve collaboration, the acquisition of knowledge and technology literacy, and change of attitudes towards learning. Additionally, there were specific cases in which other skills like metacognitive, communication, or problem-

solving were also enhanced.

One of the benefits ICTs offer is their omnipresent nature that allows students to keep learning outside of classrooms, taking education to places where social, cultural cost, and time impediments factors exclude people (Tinio, 2003). Furthermore, the impact of ICTs on the learning environment appears to be effective in the creation of innovative pedagogical models, in the promotion of collaboration among teachers, students, and educational management, as well as the will to continue acquiring knowledge (Järvelä, 2006).

Moreover, ICTs expand access to education by offering multiple online learning resources accessed anytime, anywhere, and by anyone (Flores-González et al., 2022) to avoid relying only on printed, limited, and outdated physical material. Ideal learning types based on ICTs are asynchronous learning - characterized by a time delay from the instruction of activities until their fulfillment by students- and synchronous learning, which allows education simultaneously by multiple people (Tinio, 2003).

Multimedia tools like videos and television can motivate learners because of their genuine, appealing, and demanding materials, resources, and content. Moreover, the Internet can enhance motivation not only due to its richness of online content material but also by connecting learners with experts in the field and other learners. Individual freedom is considered for efficient learning in our modern society because technology encourages student-directed education, which allows learners to manage how and when they have access to information and knowledge (Facer & Green, 2007).

In this respect, Edson (2011) stated that teachers should be able to provide students with a user-driven education to find alternative ways of searching for information and developing their critical thinking skills, taking an active role in their learning process, “rather than being passive consumers of content” (Lee & McLoughlin, 2008, p. 647).

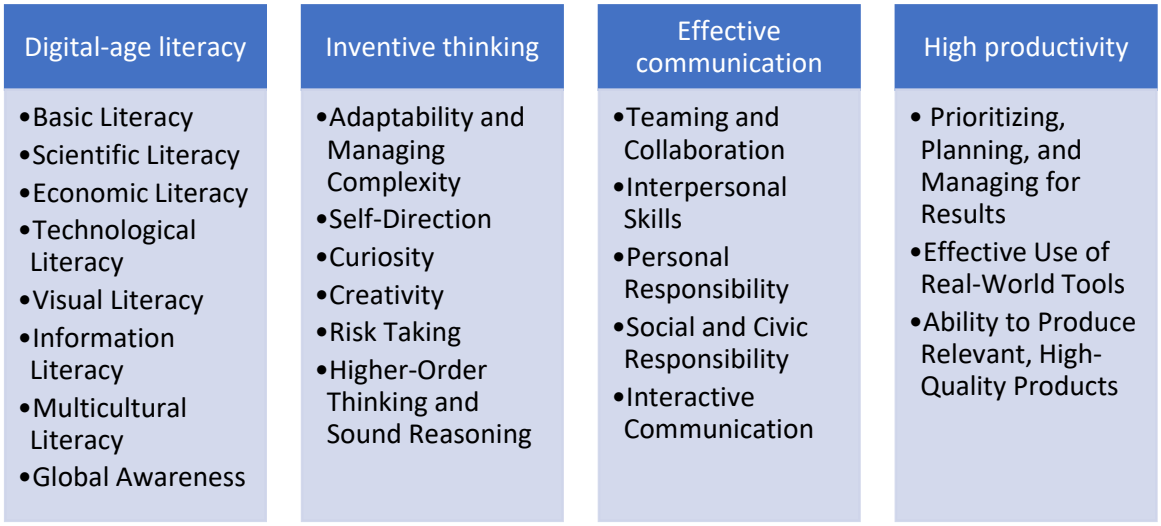
Since ICTs have had a positive impact on the educational field, education has changed over the past decades by going from a teacher-centered model to a learner-centered one, supported by five types of learning that encourage learner-centered environments: active learning, collaborative learning, creative learning, integrative learning, and evaluative learning (Tinio,

2003).

Source. ICT in Education (Tinio, 2003, pp. 9-10).

Nowadays, the presence of ICTs in workplaces is increasing exponentially, making these technologies a crucial part of their everyday activities. Therefore, it is fundamental to prepare students and make sure they meet the demands technological literacy to adapt to this society.

These skills were identified by The North Central Regional Educational Laboratory (NCREL) as digital-age literacy, inventive thinking, effective communication, and high productivity (Lemke, 2002).



Source. enGauge 21st Century Skills: Literacy in the Digital Age (Lemke, 2002, p. 12).

The TPACK Framework

Learning new knowledge and skills is not always an easy task: it can be a time-consuming activity, and sometimes, teachers do not receive suitable training for this process. Therefore, they might give a single approach for everything without taking different contexts in education into consideration. An efficient way to integrate technology into teaching must combine what teachers know with how they apply that knowledge in their praxis (Moeller & Reitzes, 2011). This situation led Shulman (as cited in Harris et al., 2009) to propose a framework that meets the needs of education and technology and describes the interaction of content knowledge,

which is what teachers know, and pedagogical knowledge, which is how teachers apply what they know. Since then, several researchers have expanded on this topic and contributed more information to the study, evolving from Pedagogical Content Knowledge (PCK) to Technology, Pedagogy, and Content Knowledge (TPACK).

Content knowledge. It refers to the comprehension of a subject (or various) and includes "concepts, theories, ideas, organizational frameworks, knowledge of evidence and proof, as well as established practices and approaches toward developing such knowledge" (Harris et al., 2009, p. 63). Since knowledge varies from field to field, teachers must understand the basis of the knowledge they teach; otherwise, students could be at risk of learning wrong information and misconceptions, an unwanted outcome in education (National Research Council, 1999).

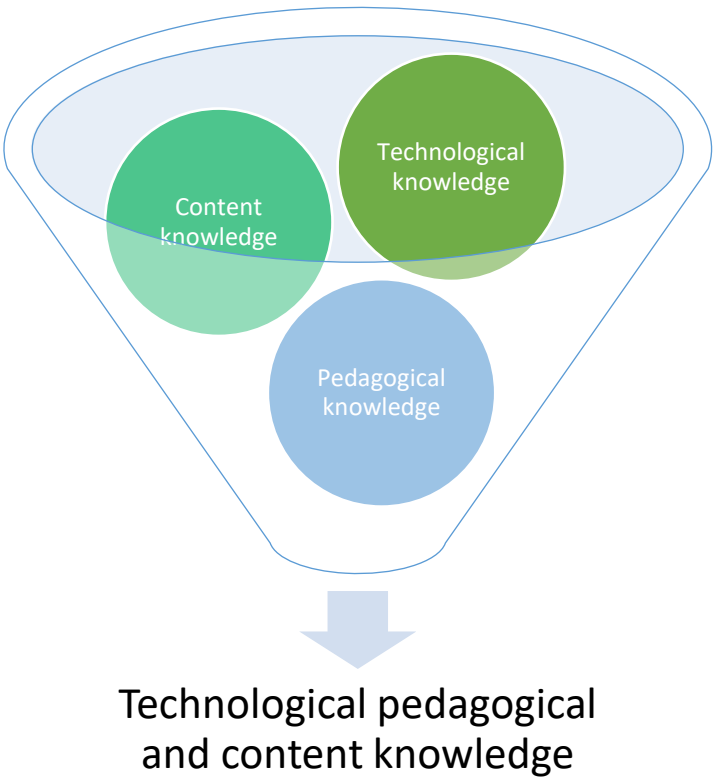
Pedagogical knowledge. It is the knowledge about the methodology of both teaching and learning processes, and it attempts to comprehend learning methods, lesson planning, classroom management techniques, and evaluation of students and "includes knowledge about techniques or methods used in the classroom, the nature of the target audience, and strategies for evaluating student understanding" (Harris et al., 2009, p. 64). Teachers must learn how students acquire knowledge, skills, habits, and dispositions to learn, requiring a vast knowledge of cognitive, social, and developmental learning theories.

Technology knowledge. It is the ability to accomplish a task in different ways by using technology (Koehler & Mishra, 2009). Besides, technology knowledge is a term that not only refers to computer literacy but also 1) understanding information technology widely enough to use it daily, 2) identifying when information technology supports or impedes the achievement of objectives, and 3) being able to adjust to changes in information technology constantly; therefore, it requires a profound understanding and domain of information technology for information processing, communication, and problem resolution, facilitating ideas to fulfill objectives and learning alternative ways to reach them (Harris et al., 2009).

Technological pedagogical content knowledge. It is a sophisticated relationship between content, knowledge of technology, and pedagogy (Koehler & Mishra, 2009). Besides, it is

impossible to apply a single technological solution for everyone and everything; instead, teachers must explore the interactions between technology, pedagogy, and content in specific contexts to understand their interactions and generate efficient solutions; otherwise, these relationships will fail due to their generic and inefficient solutions (Harris et al., 2009).

It is common for teachers to struggle whenever a new technology rises in popularity because they need to restructure the relationship between these three key components (technology, pedagogy, content) and question their basic fundaments to make legitimate connections and modify their curriculum. Indeed, they need to know what they're teaching, make connections between that knowledge and what students already know, and integrate technology in the process (Peruski & Mishra, 2004). Thus, teaching with technology is a process with complex relationships that constantly change but also needs to be modified periodically to fit in as many contexts as possible to be viable and efficient.



Source. What is technological pedagogical content knowledge? (Harris et al., 2009, pp. 60-70)

2.3 Difficulties to integrate ICTs into educational contexts

Previous lines described the benefits that ICTs provide for education; nonetheless, some of those premises did not consider the several factors that might affect their incorporation into educational contexts.

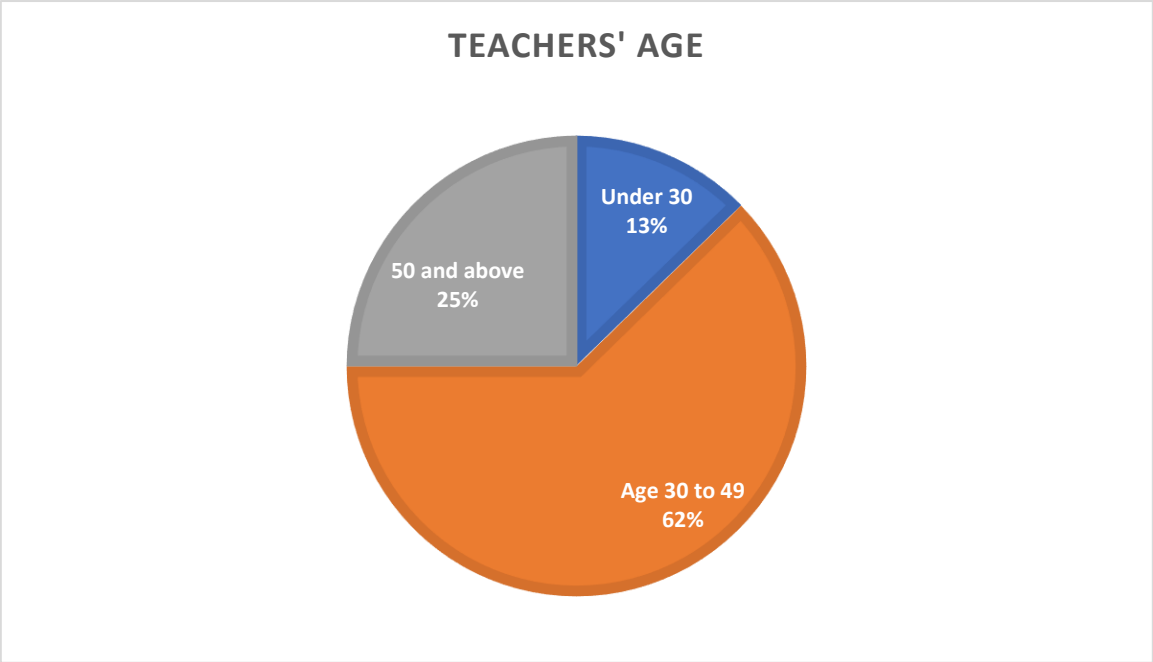
ICTs have received several criticisms throughout the years, and some of them are related to cultural differences, established practices at school, fear of change, power relationships, and impediments and conceptions about teaching and learning (Sancho, 2008); nonetheless, this project focuses specifically on critical issues that interfere with the direct integration of ICTs in education (Alonso et al., 2009).

Duolingo has yet to be incorporated into formal settings and learning, making it difficult for Duolingo to showcase its true potential in language learning. Thus, how is Duolingo incorporated into formal instruction? It relies on the grammar-translation method to teach vocabulary, and philosophy claims that foreign language learning is obtainable through translation and grammar.

In the past, it was for teaching languages and is still the most popular language teaching method nowadays due to its practical and economical nature. However, it has received criticism since its deficiencies outnumber its benefits (Elizabeth & Bhaskara, 2004). One of these drawbacks states that this method only focuses on reading and writing abilities, completely ignoring speaking and listening. Due to this situation, Duolingo offers a solution to this criticism by including speaking and listening exercises in its language courses. It makes a difference in the way Duolingo is perceived because even though it works with the grammar-translation method, they do not share the same weaknesses.

Another critical issue is the generational gap because, in 2018, the average age of secondary school teachers from Mexico was 41.7 years (OECD, 2019). People born in the 1980s are the first generation to have grown up surrounded by ICTs (at least those living in first-world countries), and they are expected to be proficient, skillful, and creative with technology (Sancho, 2008). Several active teachers started their careers in an analog world that only required them to be proficient in reading and writing texts to transmit the content to their

students and to answer questions for future tests; as a consequence, they have issues understanding and using ICTs properly and end up fearing them or not using them at all (Koehler & Mishra, 2009). Nowadays, that is no longer permitted because it is also fundamental to know how, why, and for what purpose in addition to knowledge, requiring teachers to ease students' learning instead of just transferring information (Sancho, 2008).



Source. OECD, 2019.

Even though researchers and educators have tried several times to integrate ICTs into learning tools, there are not many studies that explore their integration into teaching and learning. It is difficult to rate these technologies through standard evaluations because they do not offer a precise answer to how ICT enhances the learning process, and there is inconsistency in their results, not to mention that some studies could not find a significant difference between learning with and without ICTs (Sancho, 2008).

In addition to that, research that supports the use of ICTs might be deceivable because their benefits are due to other factors such as teaching methods, predisposition, and previous experiences by both teachers and students.

Five levels of technology use in education					
	Presentation	Demonstration	Drill and practice	Interaction	Collaboration
Print	Yes	Yes	Yes	No	No
Audio/video	Yes	Yes	No	No	No
Radio	Yes	Yes	Yes	No	No
TV broadcasts	Yes	Yes	Yes	No	No
Computers and Internet	Yes	Yes	Yes	Yes	Yes

Source. ICT in Education (Tinio, 2003, p. 11).

There are five levels of technology use in education: presentation, demonstration, drill and practice, interaction, and collaboration (Haddad & Drexler, 2002). Thus, how can ICTs be classified into those different categories? Into the presentation and demonstration categories, and all of them, except for video technologies, ought to be classified into the drill and practice category. Only networked computers and the Internet fall into the interaction and collaboration category, making them the most suitable technologies to achieve those goals; however, their full potential will continue as a mystery if "they are used merely for presentation or demonstration" (Tinio, 2003, p. 11). The solution, instead of talking about ICTs in a general way and trying to prove that they enhance learning results (usually determined by standardized tests), is to come up with specific applications of ICTs that take into account students' experiences and the value they have in education: studies should focus on the ways that these technologies might be able to transform schools into innovative educational institutes (Sancho,

2008).

2.4 Teaching English vocabulary language with Duolingo

We live in a very convenient time to learn languages. In the last 25 years, humanity has incorporated technology into education, from relying only on knowledge and language experts to confiding in self-teaching. Although language learning can be possible in both formal and informal environments, multimedia resources such as movies, TV shows, songs, videogames, chatrooms, social media, and language learning applications are tools for modern students and part of informal language learning, which encourages learners to learn a target language more naturally and engagingly (Montrul, 2020). The growing amount of cell phones around the world is a reality nowadays. Since their appearance, cell phones have evolved in different aspects. In the beginning, they were for calls; eventually, they incorporated innovative functions such as text messaging, clock, alarm, access to the Internet, calendar, agenda, radio, and even simple games. The now-called smartphones have kept evolving and added more and more applications and functionalities to their arsenal, like going from four-inch tiny screens to 7.2-inch phablets or big foldable phones (Walker, 2021).

Moreover, smartphone features have increased considerably since their recent appearance, and they will continue growing alongside the technology. Almost professional cameras, mobile contactless payment, water-proof devices, face-recognition technology, triple-sensor cameras, fingerprint sensors, and augmented reality are some cutting-edge features that cell phones have these days (Techfunnel, 2021). It is no surprise that they already replaced landlines in popularity and use (Ahmed, 2016).

Duolingo is one of the many resources and tools that mobile and informal learning offers. Its mission is to personalize education by making learning fun while being free and universally accessible (Duolingo, 2022d). The project was initiated in 2009 and launched on November 30, 2011, by Luis von Ahn and Severin Hacker. As of 2021, the platform, with over 500 million users, offered 41 language courses (38 for English speakers), specifically, English language in 22 languages (Duolingo, 2022c). Even though English speakers have languages to

choose from, the most popular language to learn is English, followed by Spanish and French (Blanco, 2021). The software is accessed through its desktop website from any Internet browser and is also available for download on Android and iOS systems. The platform offers more than just language courses: it has an ongoing research team and a website offering job positions within the company (Duolingo, 2022d). Besides, research of eight weeks conducted from September 2012 to November of that same year proved the veracity of the platform (Vesselinov & Grego, 2012). The subjects were native English speakers working with at least 18-year-old Spanish learners. None had a Spanish advanced level, Hispanic background, or resided outside the United States. They took two tests, one at the beginning and the other at the end of the study. The results showed findings in points (the higher, the better), and the effectiveness of Duolingo was measured as language improvement per one hour of study. The results were favorable, estimating that a person with zero knowledge of Spanish would need between 26 and 49 hours (an average of 34 hours) to cover the content from a first college semester of Spanish classes. A crucial factor for higher effectiveness was motivation, with people studying for travel being more motivated than people learning the language just for personal interest. Finally, basic-level students learned more than advanced students. There is a proposition from a research project stating that the reason for this to happen is because Duolingo works on the grammar-translation method; as a result, difficult words, phrases, and sentences are not as used as basic and simple ones, which are easier to translate and remember (Ahmed, 2016). The previous research paved the way for other projects to investigate Duolingo and gather information throughout the time. One specific study concludes that U.S. university students achieve four semesters of language proficiency in double the time as Duolingo learners (Jiang et al., 2020), and another study suggests that seven units of Duolingo courses equal five university semesters in reading and listening (Jiang et al., 2021). The number of projects focused on Duolingo is increasing exponentially, and teachers must seize the opportunity to learn about the benefits of the platform and to come up with ideas for their classes.

Duolingo for Schools. In 2016, Duolingo released Duolingo for Schools, a platform designed to enhance language learning within formal educational settings. This feature, which is also free, is meant to be used by educators, allowing them to create assignments and track down students' progress by their time spent on the app, their earned experience points, and their fulfilled activities (Pothireddy, 2022). To join a virtual classroom, students need to accept an invitation from their teachers through email, link, or code (Miller, 2021). Access to curricula of all languages based on the Common European Framework of Reference for Languages (CEFR) and Zipf's law (Piantadosi, 2014) are other features teachers must take into account if they want to ease their job (Miller, 2021). Consequently, many language learners, teachers, and institutions have started to implement Duolingo in their activities because it has the potential to improve not only performance in English but also teaching methods.

2.5 How to evaluate vocabulary learning with Duolingo

Duolingo grants experience points (XP) used to reach a daily goal and modified at any time: casual (10 XP), regular (20 XP), serious (30 XP), and intense (50 XP). Learners can obtain experience points through diverse activities:

- Individual lessons (10 XP + bonus)
- Skill practices (10 XP)
- Practices (10 XP)
- Skill test-outs (20 XP)
- Checkpoint quizzes (50 XP)
- Placement test (100 XP)

If Duolingo depends on the user, metrics ensure that learning is personalized and efficient. Therefore, it centers on:

1) a data-driven approach that treats language as data and students as investigators who need to discover the target language

2) long-term retention

3) explicit instruction

4) implicit learning so that students do not worry about grammatical rules. Instead, they focus on discovering language patterns to create generalizations similar to how children acquire their first language (Duolingo, 2022b).

Duolingo courses have various categories named skills, represented as circles of different colors. Each one introduces diverse topics and vocabulary (approximately 30 new words and grammatical definitions) from the most common vocabulary first to harder content later (Blanco, 2021).

Furthermore, the content of every skill contains five levels, enhancing a specific language area (Rollinson, 2018). Once students complete the last level, it will turn golden. Furthermore, each degree has several lessons that help students with their four language abilities (listening, speaking, reading, and writing) (Blanco, 2021).

List of Duolingo levels and their features
Introduction level: recognition. The first level presents new vocabulary using image exercises in which learners must choose the correct image that matches the newly introduced word. Assisted recognition exercises introduce grammatical definitions by asking learners to translate sentences in the target language into their mother tongue with the help of a word bank.
Review level 1: assisted production. At the previous level, learners had their first encounter with new vocabulary and grammar. At this level, they keep trying to produce sentences in the target language using assisted production exercises, which are very similar to assisted recognition exercises since both rely on translating sentences aided by word banks but differ from execution, meaning that in assisted production exercises, learners must choose words in the target language instead of in their mother tongue.
Review level 2: recall exercises. So far, learners have used word banks to facilitate the translation of sentences. At this point, recall exercises strengthen reading ability. In these exercises, learners must translate sentences in the target language into the mother tongue.

However, word banks are no longer available.
Review level 3: listening. Activities require learners to hear sentences in the target language and write them down to improve their listening ability.
Review level 4: unassisted production. The last level offers the most difficult exercises since they require learners to translate sentences from the target language into the mother tongue without aid as unassisted production sentences.

Source. Rollinson, 2018.

2.6 Strategies to Learn Vocabulary with Duolingo

Although Duolingo offers several resources and tools to learn languages, students must collaborate and do their part because motivation and predisposition are not enough. They need to come up with strategies to learn part if they want to learn a new language; fortunately, here are some recommended learning techniques that every language learner should put into practice when using Duolingo:

Active recall. It is a learning technique that allows learners to effectively remember information accurately without any help. It enhances efficiency, long-term memory, productivity, and comprehension in different environments (Karpicke & Roedinger, 2008; McDaniel et al., 2009; Karpicke & Blunt, 2011). To accomplish this feature, Duolingo provides translation exercises that learners need to create from their memories to stimulate the testing effect, which states that long-term learning is enhanced when learners dedicate part of their time to remembering the previous information (Goldstein, 2011).

Spaced repetition. A method in which learning occurs within short learning sessions with increasing and separate intervals. If learners remember the information accurately, the time interval doubles; otherwise, they must go over and practice more, making it possible to retain information in their long-term memory. Indeed, Ebbinghaus tested its effectiveness, showing that spaced repetition is a superior memory formation method compared to massed learning, an opposite process where learners attempt to retain as much information as possible during long learning sessions with brief intervals (Ebbinghaus, 1913). Spaced repetition is ideal not only for

vocabulary acquisition but also for concepts, lists, facts, skills, and motor learning. It is also highly recommended by encoding variability theory, study-phase retrieval theory, and deficient-processing theory (Smolen et al., 2016).

Some recommendations of how and when Duolingo should be used (either during or after class) are presented for teachers who struggle to come up with ideas regarding the ideal use of Duolingo. It is

- for students who have finished their activities early
- as an in-class exercise
- as a reinforcement tool for students who struggle with topics
- a warm-up activity to switch languages and prepare students' language skills
- as homework
- as extra credits
- during summer and winter breaks

Finally, Duolingo has handy features in addition to regular Duolingo lessons for more variety and to keep learners more interested in learning.

Features of Duolingo

Duolingo stories. In 2019, Duolingo released this feature consisting of several short stories to improve students' listening, reading, and speaking skills, providing them with experience points in the process (Pajak & Tsai, 2019). English-speaking learners have six different languages to choose their stories from Spanish, Portuguese, French, German, Italian, and Japanese; on the other hand, the other 16 available languages have only one option: English (except for Chinese, which offers two languages: English and Japanese) (Duolingo, 2022g).

Duolingo audio lessons. In 2021, Duolingo launched a series of realistic audio lessons that vary in difficulty and primarily focus on speaking and listening abilities. Each covers a specific topic, considering what learners learned to keep challenging them. The exercises follow a pattern: first hearing words/phrases/sentences, then repeating them and finally speaking (without reading and from memory) (Blanco & Gibson, 2021).

Duolingo podcast. Duolingo has released a series of podcasts available in Spanish and French for

English speakers and English for Spanish and Portuguese speakers on these platforms: Spotify, YouTube, Apple Podcasts, and Google Podcasts (Duolingo, 2022f). Each one narrated by a native speaker of the target language introduces a new story (based on real stories most of the time) to keep topics diverse and students interested. In this way, they have an appropriate difficulty feature so learners can understand them no matter what their proficiency level is. Besides, it has transcriptions in case learners miss a word or want to practice their speaking ability (Duoplanet, 2021).

Duolingo online events. As the name suggests, Duolingo created a website for learners to practice their target languages through conversations with others in Zoom (a software for video conferencing) while earning experience points. Some events are free, but others charge a fee depending on the host. It is worth mentioning most of the offered languages, especially English, have constant events (Duolingo, 2022e).

2.7 Conclusion

ICTs are a particular topic to discuss when they are associated with education: some stand in favor of them while others roundly deny using them; nonetheless, there is no denying the impact and influence they have had these days. Technology has taught us that changes in instruction happen very fast because it improves education. In this case, both our university and faculty welcome innovation in pedagogy based on the use of ICTs: they have adjusted many of their subjects and curricula to fit the current use of technology. Besides, they have allowed students free access to the Internet and implemented TVs and computers in classrooms that every teacher should know how to use to support their classes. Even though that is a move in the right direction, the real issue emerges when teachers use technology in a way that both ICTs and their methodology engage because their predispositions are crucial when integrating ICTs into education. That is why if they cannot keep learning, they will not be able to keep teaching either, especially within a globalized society that is constantly changing and evolving (Sancho, 2008). As expected, ICTs cannot fix the mentioned problems by themselves, but they do have the

potential to expand access to education and improve its quality (Tinio, 2003). Thus, there should be a complementary tool that helps students learn languages inside and outside schools. That is why this project research merely focuses on Duolingo as a complementary tool to learn languages.

CHAPTER III: METHODOLOGY

3.1 Introduction

While the previous chapter established the literature framework supported by various authors, this chapter strives to explain in detail the research methodology used in this research project. The points that will be discussed are the research design, subjects of the study, instrument, data collection, and analysis procedures, as well as conclusions regarding the chapter, and each of them provides information regarding the research methodology that made this study possible.

3.2 Research design

As mentioned before in the previous chapter, Duolingo has become a prevalent language learning platform (if not the most), and more users keep joining the forum every day; however, more studies must evaluate the promise suggesting that Duolingo is a tool that you can rely on when learning languages.

This study aimed to investigate further and provide data supporting this promise and was conducted under a quantitative design because it followed an organized process (Hernández et al., 2014) to test an existing supposition regarding the efficacy of Duolingo as a tool for language learning.

Since quantitative design can be only divided into two types, it was not difficult to determine that no experimental investigation was more suitable due to the nature of the study, which strictly requires data not to be intentionally altered by anyone at all; instead, the researcher merely focuses on observing existing situations whose variables cannot be manipulated because they already happened. All the information and data were collected during a unique time to analyze the variables of the sample, as well as their frequency and their relations during that specific time, making this work a cross-sectional study.

Additionally, the scope of the study is considered to have an exploratory nature because it studies "potential variables in a specific moment" (Hernández-Sampieri & Mendoza, 2018, p. 177).

3.3 Subjects

Selecting the subjects of the study was not an easy task because there were several potential candidates, but, in the end, a non-probabilistic sample had to be chosen due to the nature of the study, which strictly required English learners to be the subjects of study. The downside of this approach is the limitation of the sample, which must not be generalized and should only be representative of this specific context (Hernández et al., 2014).

A group of forty college students fulfilled the requirements of this study and was selected to participate voluntarily. They were studying the eighth semester of their bachelor's degree in English Teaching at Facultad de Lenguas (BUAP) in Puebla City, Mexico. They agreed to use Duolingo from six to eight hours weekly for four months. The forty participants were the total amount of the group of students, meaning it was unnecessary to select a sampling unit since all of them were the unit of analysis.

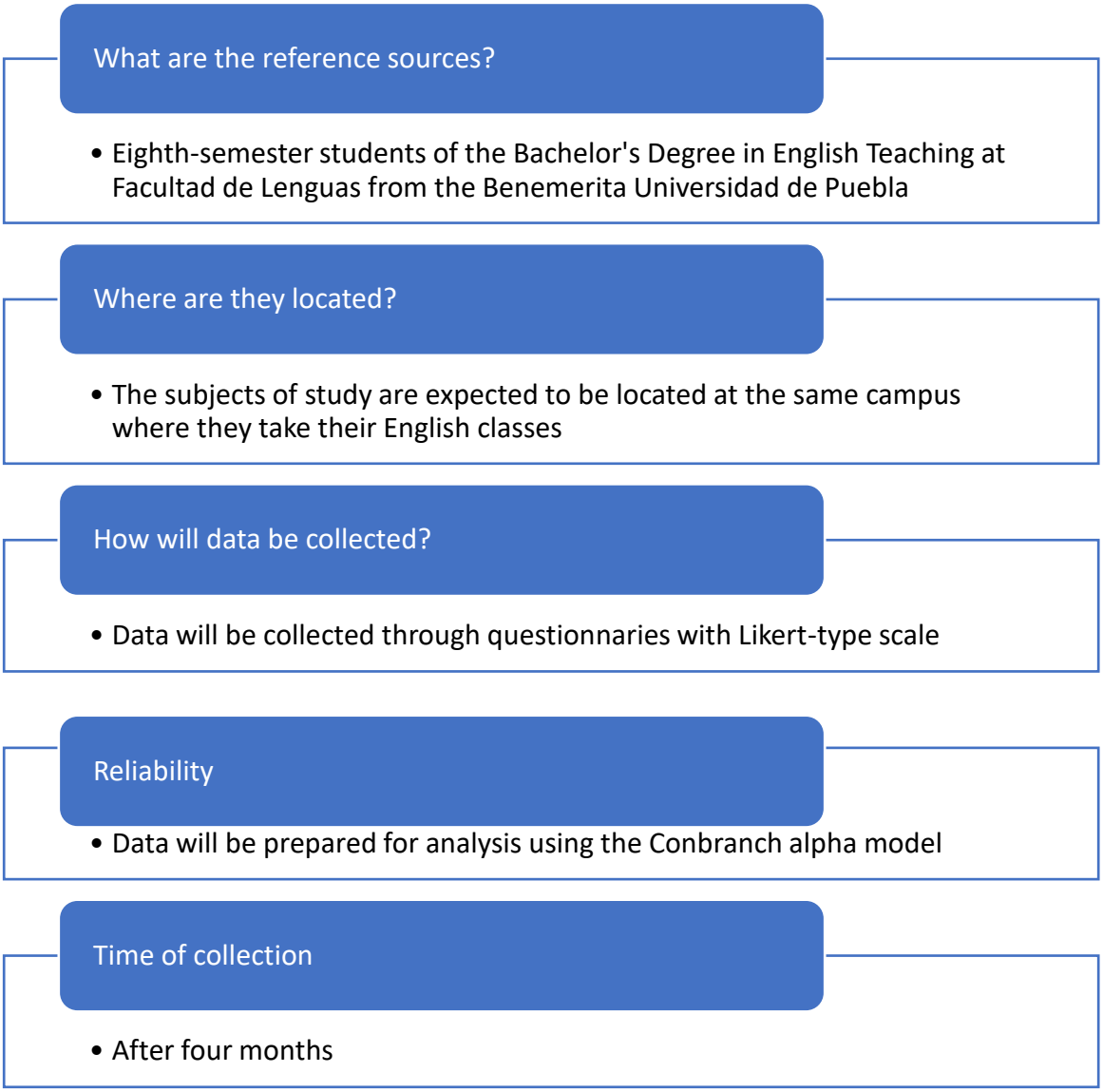
3.4 Instrument

Quantitative research should be backed up by reliable instruments that collect and analyze data; therefore, a questionnaire was selected as an instrument for this thesis project. In this respect, the Oxford and Cambridge online dictionaries define a questionnaire as a list of questions that collect information about something from several people (Cambridge University Press, 2022; Oxford University Press, 2022). This instrument has been widely used since it originated because it can be used in any scenario, and this thesis project was no exception.

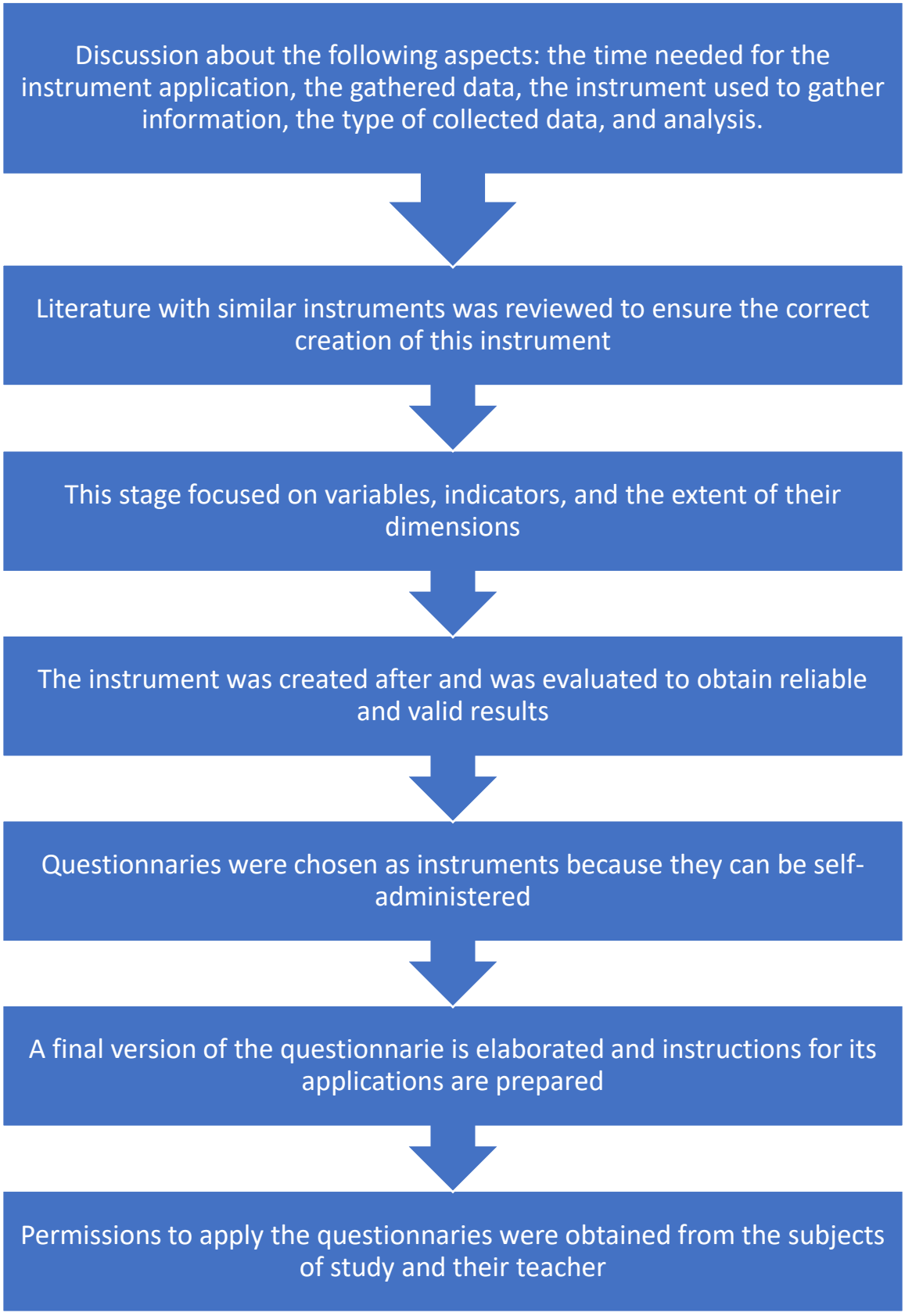
For this quantitative research, students' attitudes had to be evaluated to let us know how favorable the objected thing, Duolingo, might or might not be. A scale was then needed to assess these attitudes towards Duolingo, making the Likert-type a viable option to fulfill this job. Almost 100 years have passed since Rensis Likert developed this scale (Likert, 1932) but it is still widely used by many research projects, including this one. The questionnaire has 20 affirmations regarding Duolingo, and the subjects had to answer all the questions according to their attitudes.

3.5 Data Collection Procedures

Since the objective of this study is to evaluate if Duolingo promotes vocabulary learning and if it contributes to English language learning, the reliability of data collection and evaluation had crucial roles that needed to be checked in detail.



In addition to this, a plan had to be designed to guide the researcher through the data collection and analysis processes, which can be appreciated in the following image:


Discussion about the following aspects: the time needed for the instrument application, the gathered data, the instrument used to gather information, the type of collected data, and analysis.
Literature with similar instruments was reviewed to ensure the correct creation of this instrument
This stage focused on variables, indicators, and the extent of their dimensions
The instrument was created after and was evaluated to obtain reliable and valid results
Questionnaries were chosen as instruments because they can be self-administered
A final version of the questionnarie is elaborated and instructions for its applications are prepared
Permissions to apply the questionnaries were obtained from the subjects of study and their teacher

3.6 Data Analysis Procedures

The questionnaire was applied to the subjects of study at the end of the semester. The Cronbach alpha model measured the reliability of the instrument used to evaluate the subjects' attitudes towards Duolingo, giving a score of .975 to the covariance matrix between items, meaning that the device can be considered reliable and viable.

The answers were not altered in any way, and no other aspect or implication was deliberately changed for the convenience of this study; nonetheless, since this is a quantitative study, the depth of the students' answers is not equal to qualitative research, and they should not be treated as a generalization but only as a representation of a small group of students from *Facultad de Lenguas.*

Analysis Model

Research questions	Items
1. Does Duolingo promote vocabulary learning?	1,3, 5, 7, 9, 11, 13, 15, 17, 19
2. How does Duolingo contribute to English language learning?	2, 4, 6, 8, 10, 12, 14, 16, 18, 20

Source. Own elaboration.

3.7 Conclusion

A well-designed methodology is the key to a successful research project, and this work is no exception. All crucial points regarding the method of this work were discussed in detail in this chapter, and no information was left out, which is critical for the next chapter that discusses the results of the answers of the subjects of study.

CHAPTER IV: RESULTS

4.1. Introduction

Data that was collected from the instrument, which is a twenty-item Likert-type questionnaire, is presented and analyzed in this chapter to answer the research questions:

1. Does Duolingo promote vocabulary learning?
2. How does Duolingo contribute to English language learning?

This information will back up the existing literature regarding Duolingo. It will give an insight into forty BUAP students from Facultad de Lenguas and their perceptions of Duolingo, which were categorized into twenty variables that deepen into a specific area of language learning and are connected to the two research questions. Data is presented as graphics, and results are discussed in detail too. A conclusion considering all information compiled in this chapter is also provided at the end.

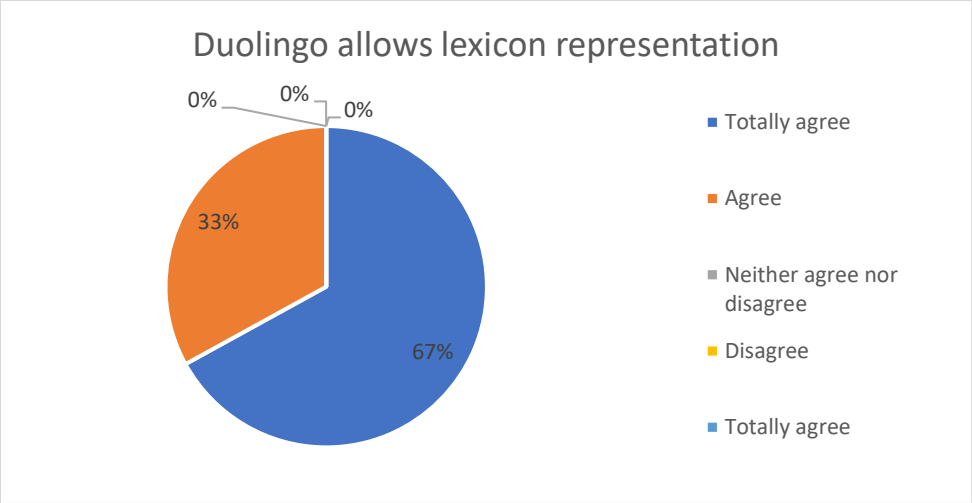
4.2 Answers to research questions

This section contains two subsections according to each research question.

4.2.1 Does Duolingo promote vocabulary learning?

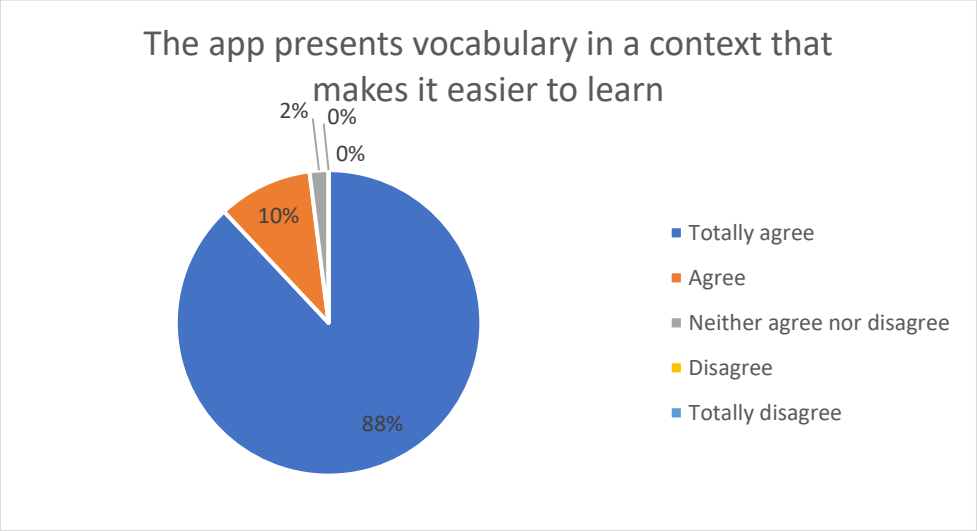
The first section analyzes data obtained for the first research question. The vocabulary is the focus; therefore, questions related to lexicon learning were asked to get the participants' perceptions of Duolingo.

These answers represent a part of the student community of Facultad de Lenguas and are not meant to represent all the students; nonetheless, their opinions are as important as the rest of them and should be considered by teachers to update their teaching methodologies by adapting the use of Duolingo outside of the classroom, which can improve many areas of language learning according to the following information that was obtained by the subjects of study.



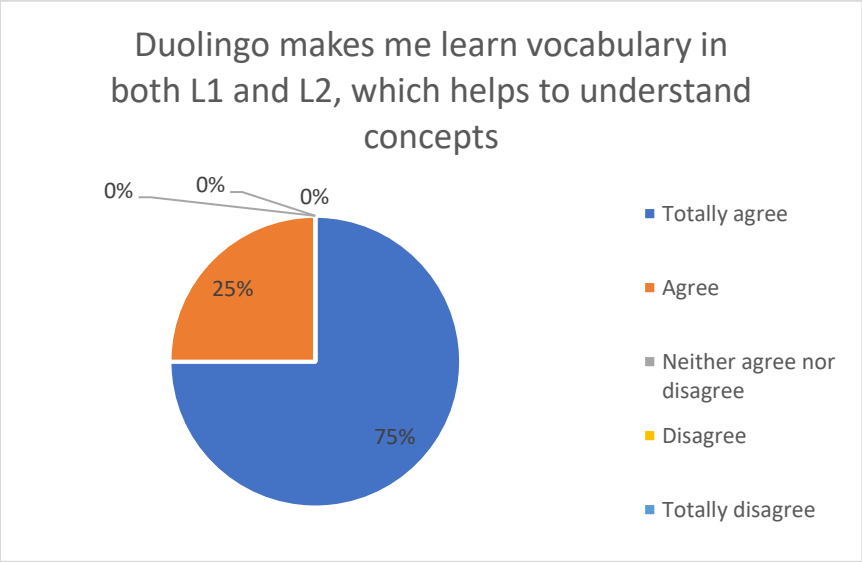
Graphic 1. Duolingo allows lexicon representation. Source. Own elaboration.

Duolingo's exercises promote lexicon representation, which allows learners to recognize words with sufficient input (Lambon-Ralph, 2001) and 67% of subjects agreed with this, while the other 33% agreed with this. Duolingo is well perceived to assist with this aspect of language learning, and teachers should consider this feedback to encourage and maybe adapt to some extent the use of Duolingo as a valuable tool for lexicon learning.



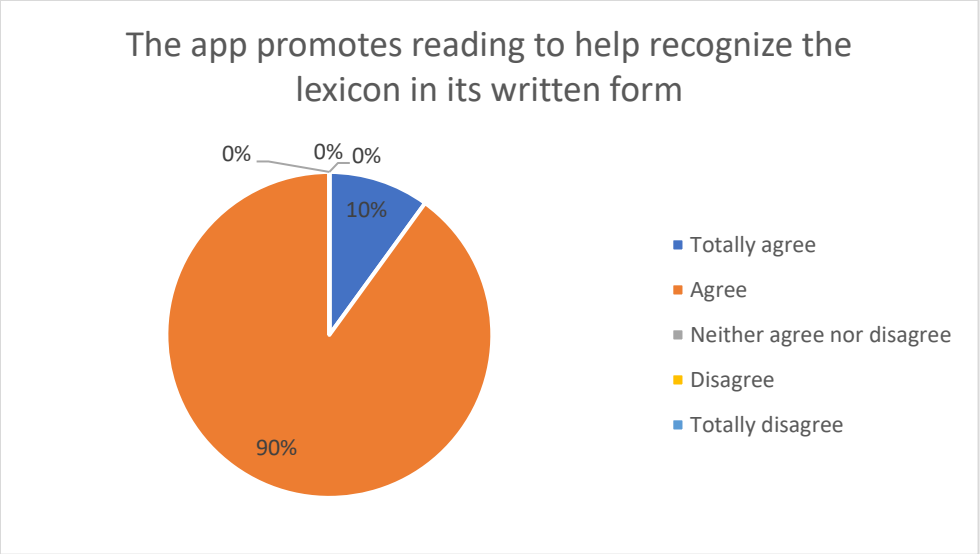
Graphic 2. Vocabulary in context. Source. Own elaboration.

This question focuses on vocabulary contextualization, a necessary part of language learning since words might have different levels of depth depending on the context. It received mostly positive perceptions from the participants, of which 88% agreed that vocabulary is presented in a context that makes it easier to learn, 10% approved of this, and only 2% neither agreed nor disagreed with it, suggesting that Duolingo could help participants to recognize words, learn their meanings and know when to use them (Godwin-Jones, 2018).



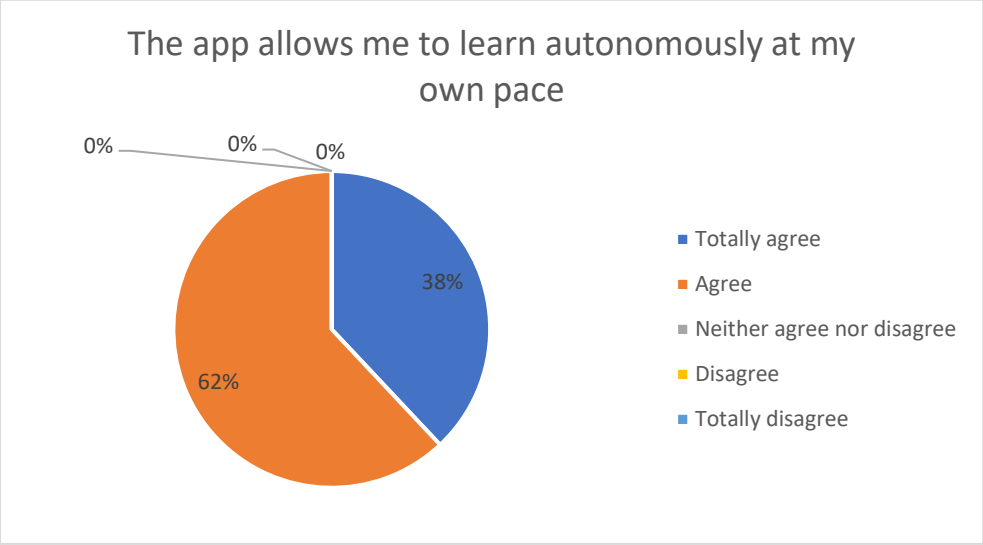
Graphic 3. Learning lexicon in L1 and L2. Source. Own elaboration.

75% of the participants agreed that Duolingo helped them learn vocabulary not only in the target language but also in their mother tongue, facilitating the understanding of concepts in both languages. The other 25% agreed with this, demonstrating a positive attitude again to Duolingo, and its potential in this aspect should not be overlooked (Duolingo, 2022a).



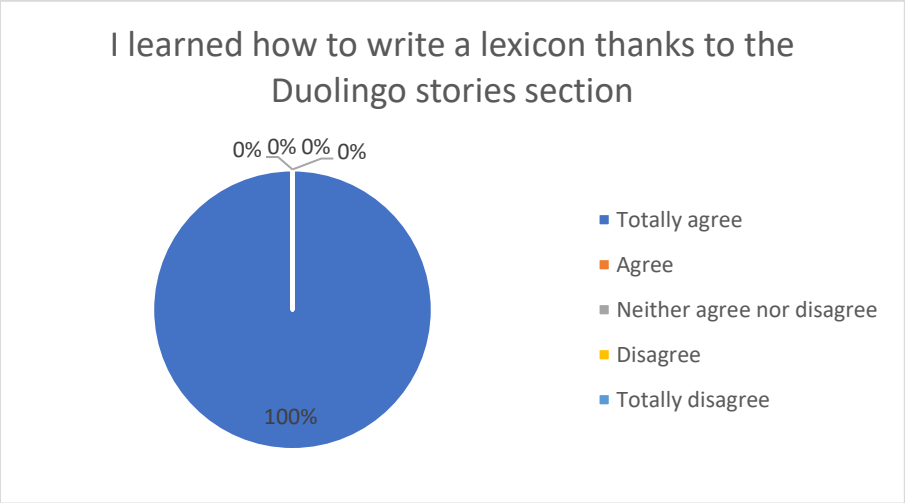
Graphic 4. Reading promotion. Source. Own elaboration.

It was previously mentioned in the first graphic that Duolingo promotes lexical representation (Godwin-Jones, 2018), so it needed to have sufficient reading activities to support written lexicon recognition (Rollinson, 2018). The participants were asked about this, and 90% of them stated that they agreed, while the other 10% agreed with this.



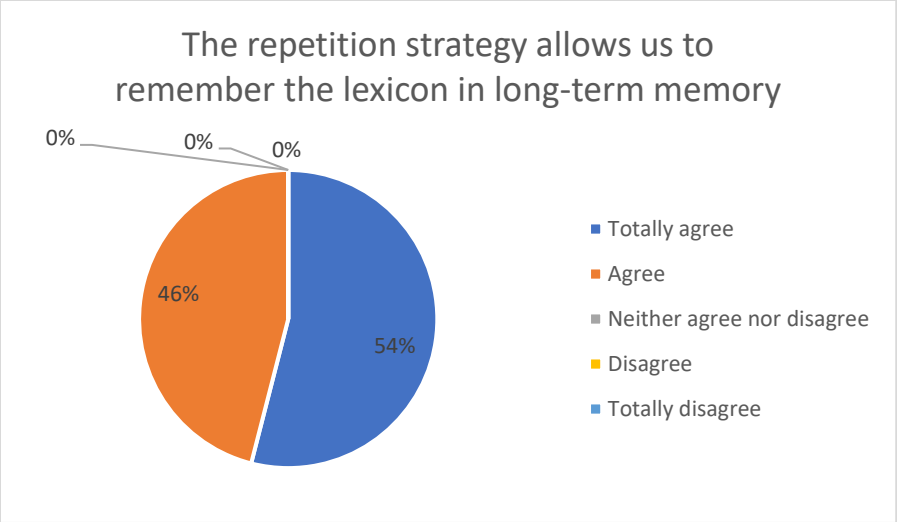
Graphic 5. Autonomous learning. Source. Own elaboration.

Most students (62%) agreed that they could have self-paced learning with Duolingo, and the remaining 38% approved of this. This aspect might not have a direct impact on vocabulary learning *per se*, but it helps students not to feel overwhelmed or pressured by language learning and allows them to have more control over their learning pace (Pothireddy, 2022). If applied properly, it might save time in the classroom that can be used in other things according to teachers' needs.



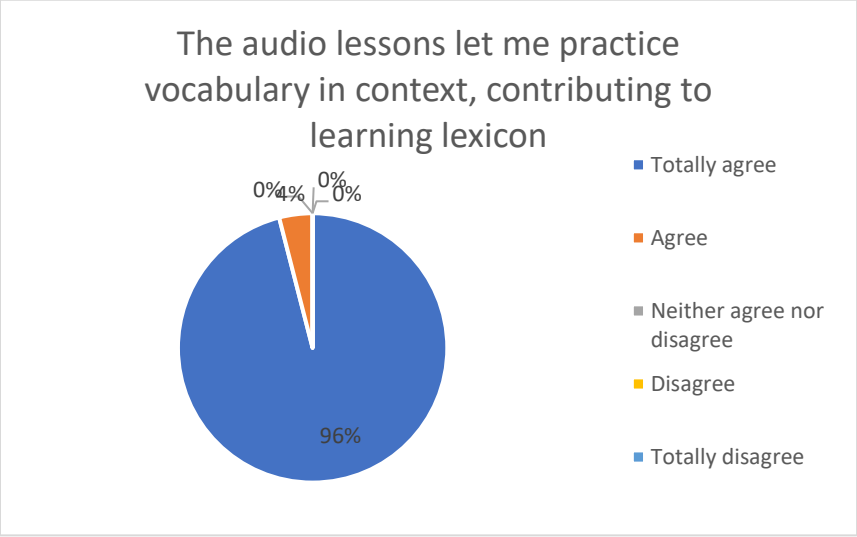
Graphic 6. Duolingo fosters writing. Source. Own elaboration.

This is the first question that all participants agreed with, meaning they have a high appreciation for Duolingo stories, which teachers should consider to promote lexicon writing. Learning how to write lexicon correctly early on will also prevent misspellings from being mistakenly learned by learners. The time they saved when avoiding mislearning a word could be used to learn new vocabulary, helping them become more proficient in the target language.



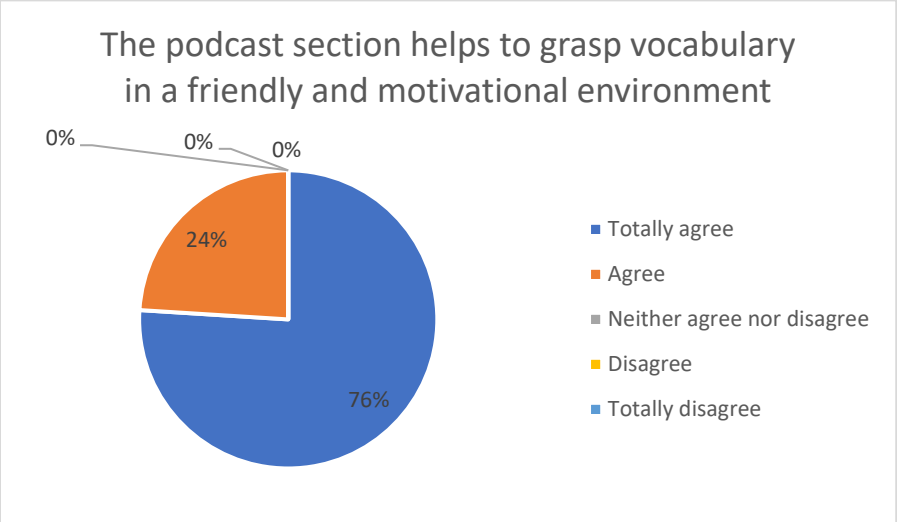
Graphic 7. Vocabulary for long-term memory. Source. Own elaboration.

This visual shows that 54% of the participants agreed that Duolingo promotes long-term lexicon learning through repetition (Smolen et al., 2016). The other 46% approved of this. Duolingo's having multiple repetition exercises further expands the potential uses that teachers could assign to it, adding another attribute to the list.



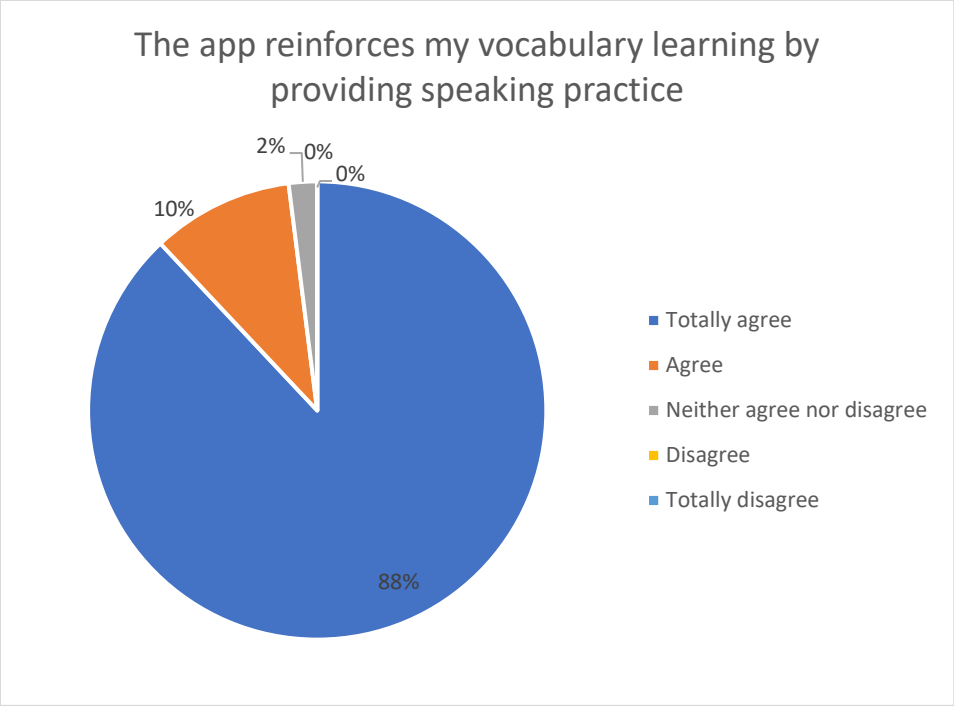
Graphic 8. Audio lessons for learning lexicon. Source. Own elaboration.

Almost all participants (96%) agreed that audio lessons help to practice vocabulary in context (Blanco & Gibson, 2021), which helps to learn lexicon. The remaining 4% agreed with this. Since most participants believed that Duolingo audio lessons are helpful, it would be ideal to implement them in classes, although not necessarily Duolingo's, but others depending on teachers' needs.



Graphic 9. Duolingo promotes a comfortable environment for learning. Source. Own elaboration.

The increased popularity of podcasts led Duolingo to create content in this format, and the participants tested its efficiency. This graphic depicts their points of view towards Duolingo podcasts: 76% of them agreed that they are helpful to reinforce vocabulary in a friendly and motivational environment (Kozma, 2003; Flores-González, 2021), and the rest (24%) agreed with this, which suggests that the correct use of these tools contributes to language learning in a friendly and intuitive environment.



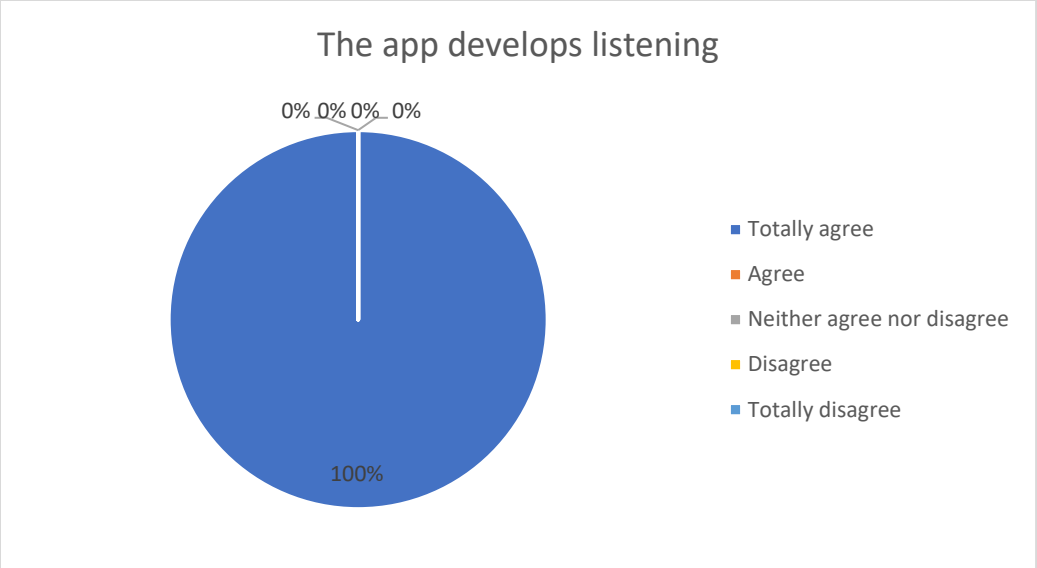
Graphic 10. Duolingo promotes speaking. Source. Own elaboration.

Most of the respondents (88%) agreed that Duolingo promotes vocabulary learning by making learners practice their speaking, 10% agreed with this, and 2% neither agreed nor disagreed with it. Indeed, Duolingo offers several speaking exercises that help improve speaking skills and are helpful when learners cannot practice their target language with a native speaker.

This last question regarding vocabulary learning received positive feedback like all the previous ones. Besides, this positive trend supports the purpose of this study and continues over the following questions.

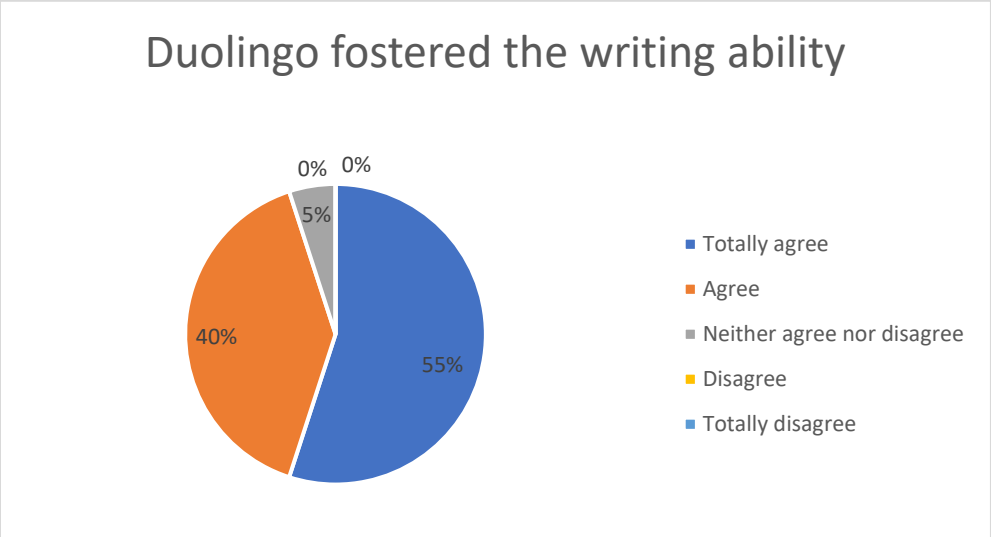
4.2.2 How does Duolingo contribute to English language learning?

For the remaining ten questions, a more general approach was taken after focusing on vocabulary learning, and other aspects of language learning were considered for this study. The following questions demonstrate these areas of interest.



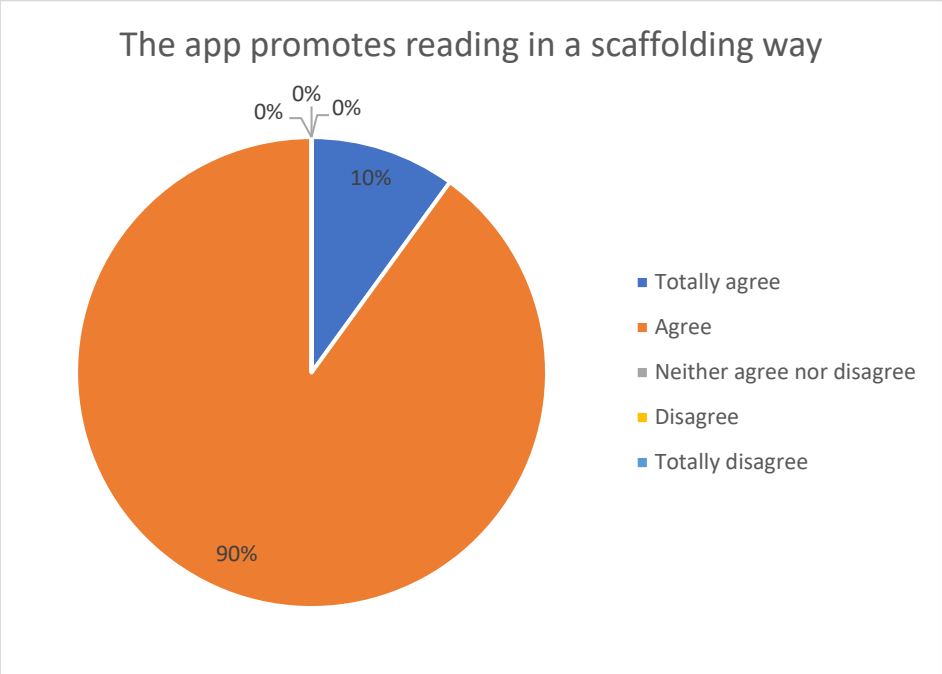
Graphic 11. Duolingo fosters listening. Source. Own elaboration.

The four language skills are always present when learning a language, and the first skill that is analyzed in this instrument is listening. All participants (100%) agreed that Duolingo develops listening, a crucial language learning skill that allows students to comprehend spoken input in their target language. It is worth mentioning that this is the second question in this work that has full participant support.



Graphic 12. Duolingo promotes writing. Source. Own elaboration.

Writing is as essential as speaking when learning a new language, and 55% of participants agreed that Duolingo fosters writing ability, 40% agreed, and 5% neither agreed nor disagreed. As a result, students who struggle the most with writing should use this beneficial tool due to the nature of the exercises, which improves this ability.



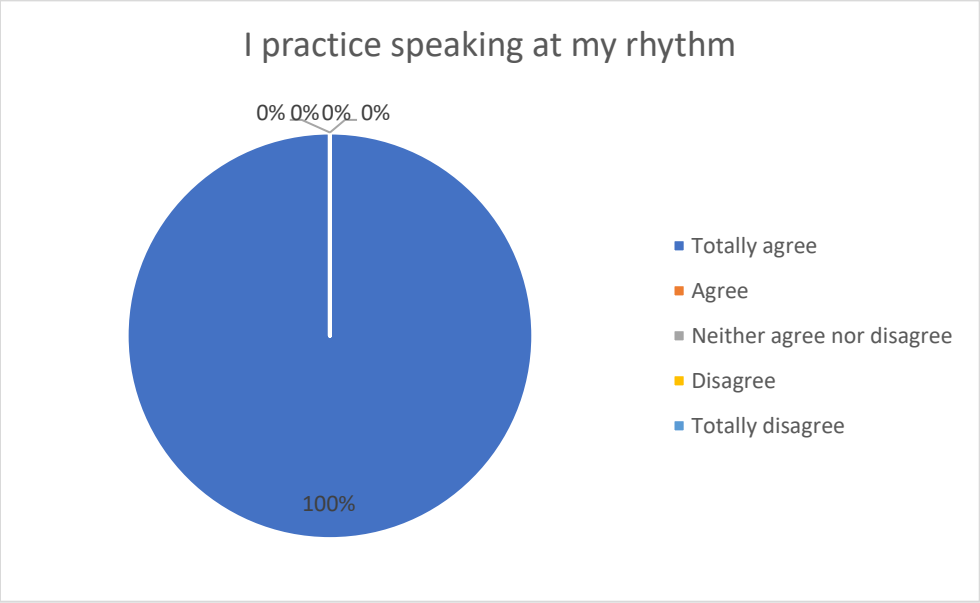
Graphic 13. Duolingo encourages scaffolding reading. Source. Own elaboration.

Most participants (90%) agreed that Duolingo promotes reading in a scaffolding way, and the remaining 10% agreed. In this method, lessons are broken down into units so they can be better comprehended by learners. It can save teachers time in the classroom since they become guides to learners who must provide them with support and chances to practice on their own (McIsaac, 2019).

Moreover, Duolingo encourages reading according to students' rhythm because it is a multi-level

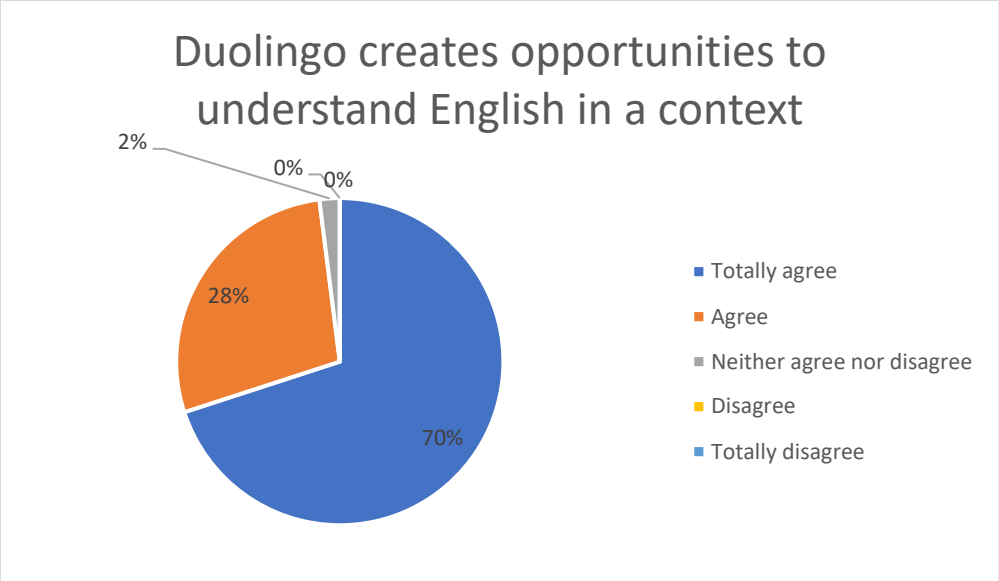
app that takes them to more complex activities and vocabulary difficulty by reinforcing lexicon in specific contexts through innovative visual materials. At this point, some strategies are also fundamental to foster reading, for instance, prior knowledge, visual aids, modeling, and students' oral expression.

Regarding the scaffolding process with Duolingo, it includes reading aloud, providing visual movements and sounds, and modeling metacognition.



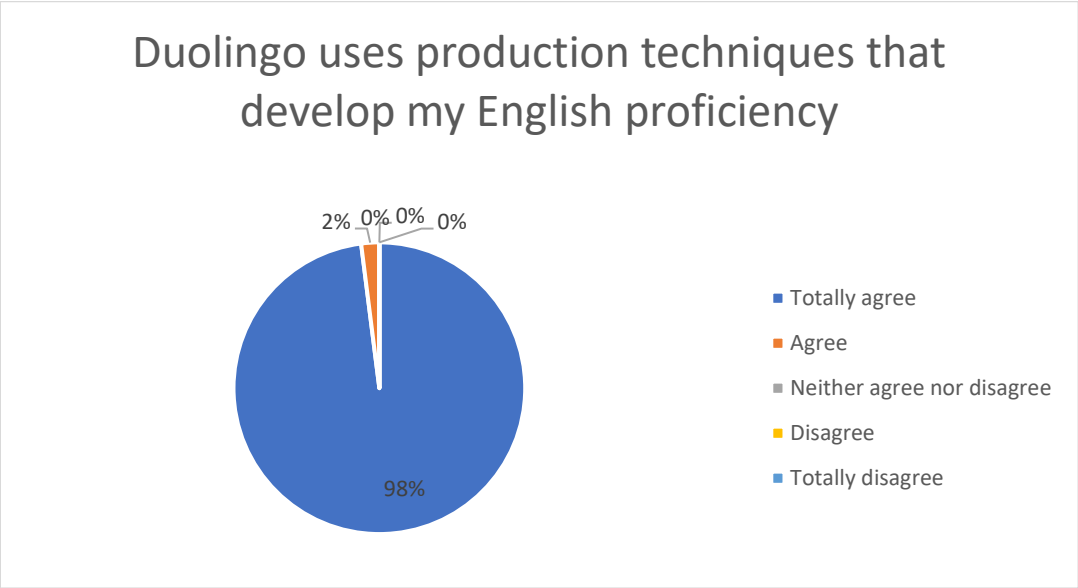
Graphic 14. Learning at students' rhythm. Source. Own elaboration.

All participants (100%) agreed that they practiced speaking at their rhythm using the app. It is the third question that the participants fully support, suggesting that Duolingo is efficient at informal learning, and they benefit from each other (Cerasoli et al., 2017).



Graphic 15. Learning English in a context. Source. Own elaboration.

Of all participants, 70% agreed that Duolingo creates opportunities that let them understand English in a context, 28% agreed with this, and 2% neither agreed nor disagreed with it. From this information, Duolingo reinforces contextualization, another positive feature of learning languages (Godwin-Jones, 2018).

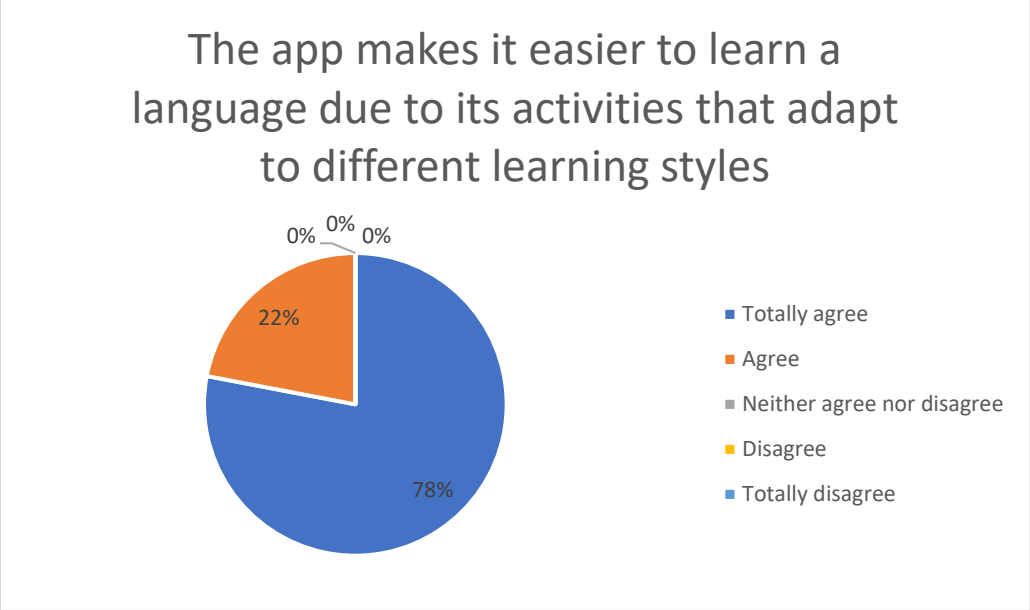


Graphic 16. Duolingo increases English proficiency. Source. Own elaboration.

Almost all participants (98%) agreed that Duolingo uses production techniques to develop proficiency in English. The other 2% agreed with this. It is necessary to acknowledge them since Duolingo's team carefully created them, and they seem to have a positive impact on students' learning according to their perceptions. Besides, by completing the beginning activities and sections of the program, the course takes them to intermediate and advanced levels, increasing their proficiency in the target language.

In this respect, different studies have proved that the inclusion of technology changed students' availability to learn (Kozma, 2003) because it seems that ITCs motivate them to be in contact with the language. Moreover, thanks to dynamic applications and activities, students find a funny way to learn based on gamification, contributing to an innovative process.

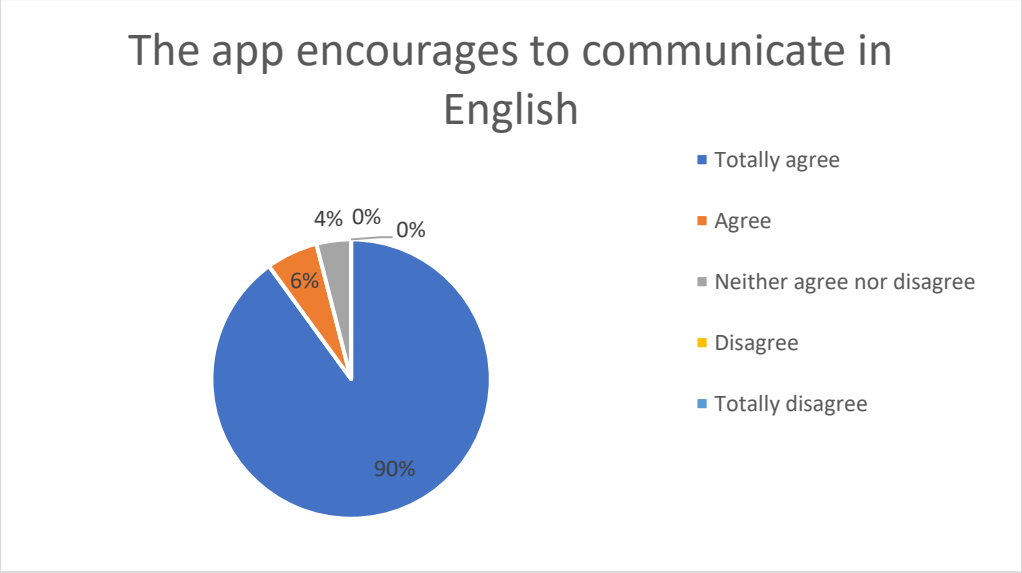
This form of working promotes collaboration and develops competencies like pragmatics and sociolinguistics that are fundamental in a target language because language and culture are interdependent.



Graphic 17. Duolingo satisfies students' learning styles. Source. Own elaboration.

78% of the participants agreed that Duolingo has activities that adapt to different learning styles, boosting language learning; the remaining 22% agreed. It can be challenging to reach all types of learners simultaneously, and Duolingo has compiled exercises that learners perceive to fit their learning styles.

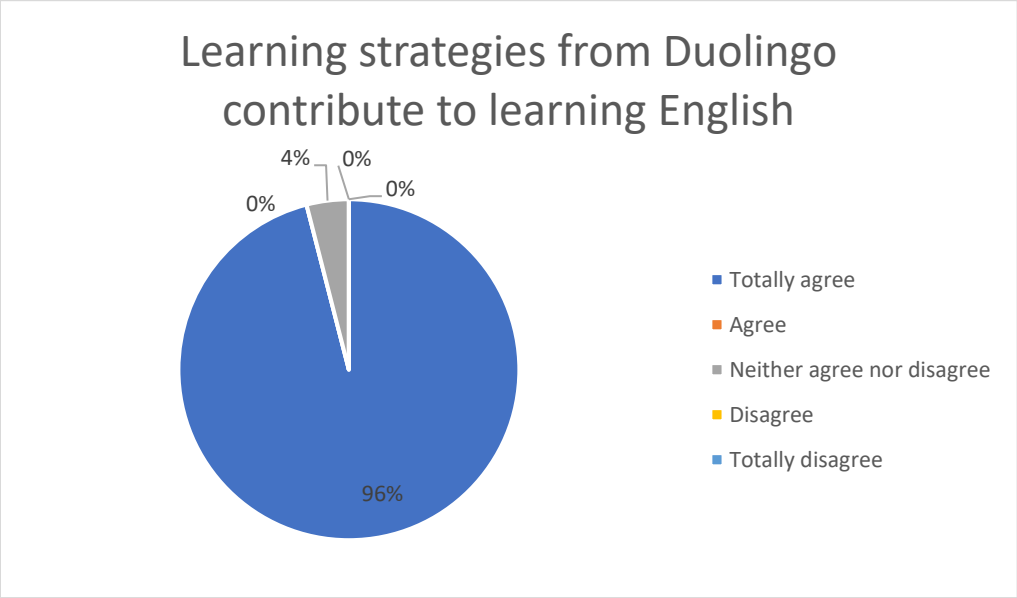
In this respect, it is difficult to satisfy students' learning styles taking into account that every student is unique, and each one has his own way to learn. That is why this app is relevant for English language because thanks to its different sections, it provides personalized feedback and practice, pushing them to progress at their own pace. Besides, gamification and lesson design help students develop a habit to study.



Graphic 18. Duolingo contributes to communication in L2. Source. Own elaboration.

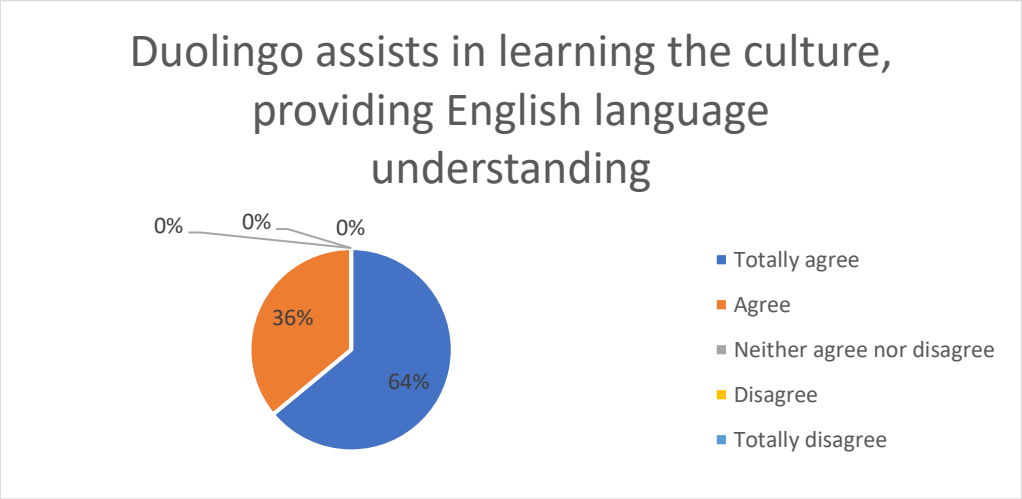
Motivation plays a significant role when learning a new language, and 90% of the participants agreed that working on Duolingo motivates them to communicate in English. The rest of them agreed with this (6%), and the remaining 4% neither agreed nor disagreed with it. If Duolingo keeps learners motivated, more effort must be made to include it in students' education to

develop better teaching practices and a comfortable learning environment.



Graphic 19. Strategies of the app foster learning. Source. Own elaboration.

Almost all the participants (96%) agreed that learning strategies from Duolingo contribute to learning English. The remaining 4% neither agreed nor disagreed with this. However, Duolingo's learning strategies keep proving valuable and well-received by language learners.



Graphic 20. Duolingo helps students learn culture and language. Source. Own elaboration.

64% of the participants agreed that Duolingo assists in learning the culture and provides English language understanding, while the other 36% agreed with this. This aspect of language learning might be overlooked sometimes. Duolingo can be considered good at avoiding falling into that situation by integrating cultural information into their activities and exercises as much as possible.

4.3 Conclusion

The answers to the questions show that students have a positive attitude towards Duolingo since no negative answers were found (disagree and disagree), and 6 of 20 questions received few neutral responses (neither agree nor disagree). Positive answers (totally agree and agree) were predominant in all twenty questions.

Students stated that Duolingo is a helpful tool to learn new vocabulary in a foreign language when constantly using the app, and it can help to enhance several aspects of language learning, including (but not limited to) vocabulary learning, conceptual learning, and four language skills reinforcement.

In addition, learners highlighted Duolingo's efficiency in providing learning strategies, techniques, activities, and opportunities that keep them motivated and engaged in learning more about their target language and its culture. A summary of this work is discussed in detail in the next and final chapter of this study.

CHAPTER V: CONCLUSIONS

5.1 Introduction

In this last chapter, a summary of the findings from the previous chapter is presented. Additionally, accomplishments of the aims, limitations of the study, and suggestions for further research are discussed. Finally, a personal reflection is provided to conclude this research project.

5.2 Summary of the findings

The findings from the previous chapter show that students have positive opinions towards Duolingo and its efficiency in improving language learning, which are supported by their answers. There were a few students that chose the neutral option (neither agree nor disagree) in some questions but never the negative options, which shows that Duolingo is well perceived by most students in most situations that were presented to them and are related to vocabulary learning and other crucial areas of language learning.

There were even some questions that had full support from all students (totally agree) or with only positive answers. Students who chose neutral options had many chances but did not have negative opinions about Duolingo. No negative aspects can be pointed out from the collected information, and even if the few neutral answers might be perceived as unfavorable by some, they are considerably outweighed by students' positive opinions.

Regarding the research questions, students' responses suggested that Duolingo does promote vocabulary learning and that it contributes to English language learning in different ways, including vocabulary learning, conceptual learning, reinforcement of four language skills, and self-paced learning encouragement. Not only does this speak highly positively about Duolingo and increase its already colossal reach, but it also benefits language learners in several aspects of language learning, becoming a beneficial situation for both parties.

5.3 Accomplishments of the aims

It was previously mentioned in the first chapter that this study aims to evaluate if Duolingo

promotes language learning, and if so, how and to what extent this occurs. From the findings of the previous chapter, it can be deducted several things about Duolingo:

Duolingo promotes vocabulary learning according to the answers from the subjects of study. Most of them were either optimistic or highly optimistic when they were asked ten questions about the efficiency of Duolingo for vocabulary learning. They highlighted some strengths of Duolingo, such as lexicon representation, contextualization, concept understanding, written lexicon recognition, self-paced learning, proper lexicon writing, repetition for long-term memorization, and vocabulary practice through context, speaking, and podcasts.

During the creation of the instrument in chapter three, it was decided that this work should not be limited to vocabulary learning but should also consider other areas of language learning that are as critical and beneficial as vocabulary learning. Those chosen areas are the development of four language skills (listening, writing, reading, and speaking), creation of learning opportunities, production techniques, adaptation to different learning styles, motivation to communicate, and culture learning as learning strategies that contributed to learning English.

Separately, they are crucial aspects that must be taken into consideration when learning a new language. When put together in learning software, they take a step further and provide students with a valuable and potential tool that learners can access through their smartphones, tablets, and computers and help them to improve those skills at their own pace in their preferred study place.

5.4 Limitations of the study

This work was conducted in (and for) Facultad de Lenguas; thus, a group of students from there were selected as the study subjects. Although positive findings were collected from their responses, only one sample of 40 students was analyzed, which has some implications for the study's limitations. An example of this size is not representative of Facultad de Lenguas; therefore, it is suggested that the sample size be increased for a more accurate representation of the population.

Another implication is that the quantitative approach was chosen to guide the methodology of this study, which lacks depth in the participants' responses. If a qualitative approach is used with

an instrument of the same type, such as an interview (structured or semi-structured), participants would provide information that they are not able to do with a Likert instrument. Additionally, the research was transversal, and only information from when the device was applied could be gathered. This issue can be countered by doing longitudinal studies that can provide even more accurate information. Seeing what students reply at different periods and not only once would give a deeper insight into Duolingo's efficiency from an extended point of view.

Lastly, the modality of the sample was virtual, and students from other learning modalities (presential and hybrid) should also be considered for works of this type. The mixed and virtual modalities become more prominent because of the COVID pandemic, which lasted about two years and severely affected and had a significant impact on education. Therefore, all learning modalities should be equally acknowledged and included in more research works of this type.

5.5 Suggestions for further research

Duolingo might be the most popular learning app, but other apps also promise to improve language learning in different ways than Duolingo. Some of them and their approaches were mentioned in Chapter Two without providing too much information since there are many of them in the application stores (Android and iOS). It is recommended that work with this potential should not be limited to the tool the study is based on; other options should also be considered as research tools for similar projects.

Another essential aspect to consider is that Duolingo was used as a tool exclusively for English language learning and ignored the other language courses the educational platform had to offer. It would be interesting to have more research projects like this one but specializing in other languages such as French, German, Italian, Japanese, Portuguese, and Spanish since they are languages that can be learned both on Duolingo and at Facultad de Lenguas (this information would be helpful in the later).

Additionally, it is essential to highlight that the subjects of study used Duolingo inside the classroom (when instructed) and not outside consideration because this latter option might have other implications that could affect the results and the whole study. Thus, more studies covering

this scenario are as necessary as their counterparts to form a bigger picture of the situation.

As a last suggestion, it is recommended to use Duolingo with another language learning app to reinforce Duolingo (and consequently, language learning). There are several app alternatives, many of which are free and well-rated by users, so choosing which one might not be easy, but the results must be worth it for learners and educators.

5.6 Personal reflection

Doing this research project has taught me some valuable things that I can apply to different areas of my life: as a student, I have more interest in researching information and have learned how to do it properly; as a teacher, I have learned to take benefit from technology and to implement things that could potentially enhance my teaching methodology; and as an education worker I have learned that learning can be fun and to be more creative to cover as many learning types as possible when planning a class.

Now, I can implement Duolingo in the classroom and will be doing it until I find a better tool that could substitute or complement it. We, as educators, are constantly learning things from students in the classroom, so having tools that both students and teachers can use is a benefit that many people haven't experienced yet. Therefore, it's crucial we spread the word and encourage learners to take advantage of Duolingo or any other language learning to improve their language learning.

Based on my experience with Duolingo, I highly recommend educators use this learning platform not only for English but also for other languages they might want to learn or practice. Even their mother tongue could be improved by using it.

References

Ahmed, H. B. (2016). Duolingo as a Bilingual Learning App: a Case Study. Arab World English Journal, 255-267.

Alonso, K., Molto, O., Ornellas, A., & Sánchez-Valero, J. (2009). Two decades of ICT Policy in Education. Changing discourses. Changing practices? Research, Reflections, and Innovations in Integrating ICT in Education, 154-157.

Blanco, C. (2021, February 16). Duolingo 101: How to learn a language on Duolingo. Retrieved from Duolingo Blog: https://blog.duolingo.com/duolingo-101-how-to-learn-a-language-on-duolingo/

Blanco, C., & Gibson, E. (2021, March 30). Listen up! New Audio Lessons build conversation skills. Retrieved from Duolingo Blog: https://blog.duolingo.com/listen-up-new-audio-lessons-build-conversation-skills/

Blurton, C. (1999). New directions in education. Hong Kong: UNESCO Publishing.

Cambridge University Press. (2022). Cambridge Dictionary. Retrieved from https://dictionary.cambridge.org/us/dictionary/english/questionnaire

Cambridge University Press. (2023). Cambridge Advanced Learner's Dictionary & Thesaurus. Retrieved from Meaning of ICT in English: https://dictionary.cambridge.org/us/dictionary/english/ict

Cerasoli, C. P., Alliger, G. M., & Donsbach, J. S. (2017). Antecedents and Outcomes of Informal Learning Behaviors: a Meta-Analysis. Journal of Business and Psychology, 33, 203-230.

Duolingo. (2022a). Duolingo. Retrieved from About Us: https://en.duolingo.com/approach

Duolingo. (2022b). Work at Duolingo. Retrieved from Duolingo: https://careers.duolingo.com/

Duolingo. (2022c). The complete list of every Duolingo language. Retrieved from Duoplanet: https://duoplanet.com/duolingo-languages-list/

Duolingo. (2022d). Duolingo Help Center. Retrieved from What is Duolingo?: https://support.duolingo.com/hc/en-us/articles/204829090-What-is-Duolingo-

Duolingo. (2022e). Duolingo Online Events. Retrieved from Duolingo:

https://events.duolingo.com/

Duolingo. (2022f). Duolingo Podcast. Retrieved from Duolingo: https://podcast.duolingo.com/

Duolingo. (2022g). Duolingo Stories. Retrieved from Duolingo: https://www.duolingo.com/stories/

Duoplanet. (2021, November 19). Duolingo podcasts: here's what you need to know. Retrieved from Duoplanet: https://duoplanet.com/duolingo-podcasts-guide/

Ebbinghaus, H. (1913). Memory: A Contribution to Experimental Psychology. (H. A. Ruger, & C. E. Bussenius, Trans.) New York: Teachers College Press.

Edson, J. (2011). Curriculum 2.0: User-Driven Education. Retrieved from Huffpost: https://www.huffpost.com/entry/curriculum-20-userdriven-_b_53690

Elizabeth, M. E., & Bhaskara, R. D. (2004). Methods of Teaching English. New Delhi: Discovery Publishing House.

Facer, K., & Green, H. (2007). Curriculum 2.0: educating the digital generation. Demos Collection(24), 47-58.

Facultad de Lenguas. (2023). Centro de Auto Acceso. Retrieved from BUAP: http://www.facultaddelenguas.com/caa-nosotros

Flores-González, E. (2020). El proceso de aprendizaje de la asignatura de Biología en modalidad blended learning. Revista de Educación Técnica. 1-10. 10.35429/JOTE.2020.13.4.1.10.

Flores-González, E. (2021). The emotions of upper secondary level students in a virtual learning environment. ECORFAN Journal Taiwan. 14-23. 10.35429/EJT.2021.9.5.14.23.

Flores-González, N. (2022). El perfil del docente y su adaptabilidad a entornos educativos virtuales. *RECIE. Revista Caribeña de Investigación Educativa, 6*(2), 99-115. https://doi.org/10.32541/recie.2022.v6i2.pp99-115

Flores-González, N., Flores-González, E., Castelán-Flores, V., and Zamora- Hernández, M. (2022). A didactic tool for updating the teaching-learning process of English as a foreign language. *Journal of Information Technologies and Communications,* 6(16), 20-28.

Godwin-Jones, R. (2018). Contextualized vocabulary learning. Language Learning &

Technology, 1-19.

Goldstein, E. B. (2011). Cognitive Psychology: Connecting Mind, Research and Everyday Experience (Third ed.). Belmont: Cengage Learning.

Gross, R. (2010). Psychology: The Science of Mind and Behaviour 6th Edition. London: Hachette UK.

Haddad, W. D., & Drexler, A. (2002). The Dynamics of Technologies for Education. In W. D. Haddad, & A. Drexler, Technologies for education: potentials, parameters, and prospects (pp. 3-17). Washington DC: Academy for Educational Development, UNESCO.

Harris, J., Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge? Contemporary Issues in Technology and Teacher Education, 9(1), 60-70.

Hernández Sampieri, R., Fernández Collado, C., & Baptista Lucio, P. (2014). *Metodología de la investigación* (6a. ed. --.). México D.F.: McGraw-Hill.

Hernández-Sampieri, R., & Mendoza Torres, C. P. (2018). Metodologia de la investigación: las rutas cuantitativa, cualitativa y mixta. Mexico City: McGraw Hill.

Holst, A. (2022, November). Statista. Retrieved from Number of smartphone mobile network subscriptions worldwide from 2016 to 2022, with forecasts from 2023 to 2028: https://www.statista.com/statistics/330695/number-of-smartphone-users-worldwide/

Järvelä, S. (2006). Personalised Learning? New Insights into Fostering Learning Capacity. In OECD-CERI (Ed.), Personalising Education (pp. 31-46). Paris: OECD/CERI.

Jiang, X., Chen, H., Portnoff, L., Gustafson, E., Rollinson, J., Plonsky, L., & Pajak, B. (2021, November 11). Seven units of Duolingo courses comparable to. Retrieved from Duolingo: https://duolingo-papers.s3.amazonaws.com/reports/duolingo-intermediate-efficacy-whitepaper.pdf

Jiang, X., Rollinson, J., Plonsky, L., & Pajak, B. (2020, August 14). Duolingo efficacy study: Beginning-level courses equivalent to four university semesters. Retrieved from Duolingo: https://duolingo-papers.s3.amazonaws.com/reports/duolingo-efficacy-whitepaper.pdf

Juárez Pineda, E. (2015, February 19). México, retrasado 10 años en tecnología educativa. Retrieved from Educación Futura: http://www.educacionfutura.org/mexico-retrasado-10-anos-en-tecnologia-educativa/

Karpicke, J. D., & Blunt, J. R. (2011). Retrieval Practice Produces More Learning than Elaborative Studying with Concept Mapping. Science, 772-775.

Karpicke, J. D., & Roedinger, III, H. L. (2008). The critical importance of retrieval for learning. Science, 966-968.

Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge? Contemporary Issues in Technology and Teacher Education, 9(1), 60-70.

Kozma, R. B. (2003). Technology, Innovation and Educational Change: A Global Perspective. Washington: ISTE.

Lambon-Ralph, M. A. (2001). Lexical Processes (Word Knowledge): Psychological and Neural Aspects. International Encyclopedia of the Social & Behavioral Sciences, 8754-8758.

Laricchia, F. (2023, May 4). Penetration rate of smartphones in selected countries 2022. Retrieved from Statista: https://www.statista.com/statistics/539395/smartphone-penetration-worldwide-by-country/

Lee, M., & McLoughlin, C. (2008). Mapping the digital terrain: New media and social software as catalysts for pedagogical change. Hello! Where are you in the landscape of educational technology? Proceedings ascilite Melbourne 2008, 641-652. Retrieved from ASCILITE Conference Proceedings.

Lemke, C. (2002). enGauge 21st Century Skills: Literacy in the Digital Age. Naperville: NCREL, METIRI Group.

Likert, R. (1932). A technique for the measurement of attitudes (Vol. 22). New York: Archives of Psychology.

Lingualift. (2023). Lingualift. Retrieved from 10 Best Language Learning Apps 2023: https://www.lingualift.com/blog/best-language-learning-apps/

Lyons, D. (2021, March 10). How Many People Speak English, And Where Is It Spoken? Retrieved from Babbel: https://www.babbel.com/en/magazine/how-many-people-speak-

english-and-where-is-it-spoken#:~:text=How%20Many%20People%20In%20The,English%20as%20their%20first%20language.

McDaniel, M. A., & et al. (2009). The Read-Recite-Review Study Strategy. Psychological Science, 516-522.

McIsaac, J. (2019, August 6). What is 'Scaffolding' in Teaching?: A Simple Explanation. Retrieved from Exceptional Lives: https://www.exceptionallives.org/blog/scaffolding-in-teaching-a-simple-explanation

Miller, T. (2021, November 29). The new Duolingo for Schools. Retrieved from Duolingo Blog: https://blog.duolingo.com/duolingo-for-schools/

Moeller, B., & Reitzes, T. (2011) Education Development Center, Inc. (EDC). Integrating Technology with Student-Centered Learning. Quincy, MA: Nellie Mae Education Foundation.

Montrul, S. (2020). How Learning Context Shapes Heritage and Second Language Acquisition. In M. Dressman, & R. W. Sadler, The Handbook of Informal Language Learning (pp. 57-). Hoboken, NJ: John Wiley & Sons Ltd.

National Research Council. (1999). Being fluent with information technology literacy: Computer science and telecommunications board commission on physical sciences. Washington DC: National Academy Press.

OECD. (2019, July). TALIS 2018 Results (Volume I): Teachers and School Leaders as Lifelong Learners. Paris: OECD Publishing. doi:https://doi.org/10.1787/1d0bc92a-en

Ogilvy, J. (2006). Education in the Information Age: Scenarios, Equity and Equality. In OECD, Think Scenarios, Rethink Education (pp. 21-37). Paris: OECD Publishing.

Oxford Business Group. (2019). Investment in education technology surges around the world. Retrieved from Oxford Business Group: https://oxfordbusinessgroup.com/reports/mexico/-report/economy/investment-in-education-technology-surges-as-markets-around-the-world-recognise-its-transformative-potential-digital-classroom-2

Oxford University Press. (2022). Oxford Advanced Learner's Dictionary. Retrieved from https://www.oxfordlearnersdictionaries.com/us/definition/english/questionnaire?q=questionnaire

Pajak, B., & Tsai, K. (2019, December 11). How we've improved the Duolingo learning experience this year (and a sneak peek toward 2020!). Retrieved from Duolingo Blog: https://blog.duolingo.com/how-weve-improved-the-duolingo-learning-experience-this-year-and-a-sneak-peek-toward-2020/

Peruski, L., & Mishra, P. (2004). Webs of activity in online course design and teaching. Research in Learning Technology, 37-49.

Piantadosi, S. T. (2014). Zipf's word frequency law in natural language: A critical review and future directions. Psychonomic bulletin & review, 1112–1130.

Pothireddy, K. A. (2022, April 15). What is Duolingo for Schools? Retrieved from Duolingo for schools: https://duolingoschools.zendesk.com/hc/en-us/articles/4405102865805-What-is-Duolingo-for-Schools

Rollinson, J. (2018, July 11). Crown Levels: A royal redesign. Retrieved from Duolingo Blog: https://blog.duolingo.com/crown-levels-a-royal-redesign/

Sancho. (2008). De TIC a TAC, el difícil tránsito de una vocal. Investigación en la escuela, 19-30.

Secretaría de Gobernación. (2019, April 29). 31.4 por ciento de la población en México son niñas, niños y adolescentes, de 0 a 17 años: CONAPO. Retrieved from Gobierno de México: https://www.gob.mx/segob/prensa/31-4-por-ciento-de-la-poblacion-en-mexico-son-ninas-ninos-y-adolescentes-de-0-a-17-anos-conapo

Selwyn, N. (2012). School 2.0: Rethinking the Future of Schools. In A. Jimoyiannis (Ed.), Research on e-Learning and ICT in Education (pp. 3-16). New York: Springer.

SEP. (2015, April 21). Aprender a Aprender con TIC. Retrieved from Secretaría de Educación Pública: https://www.gob.mx/sep/acciones-y-programas/aprender-a-aprender-con-tic-sep-df-afsedf

Smith, M. K. (2016, February 25). What is teaching? Retrieved from The encyclopedia of

pedagogy and informal education: https://infed.org/what-is-teaching/

Smolen, P., Zhang, Y., & Byrne, J. H. (2016). The right time to learn: mechanisms and optimization of spaced learning. Nature Reviews Neuroscience, 77-88.

Statista Research Department. (2023, March 14). Número de usuarios de teléfonos móviles inteligentes en México de 2015 a 2026. Retrieved from Statista: https://es.statista.com/estadisticas/1077622/usuarios-de-smartphone-en-mexico/

Techfunnel, A. (2021, July 28). New Mobile Technology to Watch in 2021. Retrieved from Tech Funnel: https://www.techfunnel.com/martech/mobile-technology/

Téllez, e. a. (2009). Proyecto programa educativo de la Licenciatura en la Enseñanza del Inglés. Retrieved from BUAP: http://www.facultaddelenguas.com/lei-plan

Tinio, V. L. (2003). ICT in Education. Manila: E-ASEAN Task Force.

Underwood, J. (2014). Digital Technologies: An Effective Educational Change Agent? In C.

UNESCO Institute for Statistics. (2023). UNESCO Institute of Statistics. Retrieved from Glossary: Information and communication technologies (ICT): http://uis.unesco.org/en/glossary-term/information-and-communication-technologies-ict

Vesselinov, R., & Grego, J. (2012, December). Duolingo Effectiveness Study. Retrieved from Duolingo: http://static.duolingo.com/s3/DuolingoReport_Final.pdf

Walker, A. (2021, May 22). Super-sized smartphones: Looking back at the 'chonkiest' phones ever made. Retrieved from Android Authority: https://www.androidauthority.com/biggest-phones-1144236/

World Bank. (2018, October 1st). Technology Offers New Possibilities for Teaching and Learning. Retrieved from World Bank Group: http://documents.worldbank.org/curated/en/731401541081357776/World-Bank-Education-Overview-New-Technologies

Ying, L. (2021, May 9). 10 Internet Statistics Every Marketer Should Know In 2021. Retrieved from Oberlo: https://www.oberlo.com/blog/internet-statistics#:~:text=Summary%3A%20Internet%20Statistics,-Here's%20a%20summary&text=There%20are%20currently%204.66%20billion,percent

%20of%20the%20global%20population