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Final Thesis

Language Learning Applications

A study on their advantages
and disadvantages from the
learners' perspective

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Abstract (Italian)

La tesi si concentra sulle potenzialità didattiche e motivazionali di alcune applicazioni per apprendere le lingue straniere in linea con il Mobile Assisted Language Learning (MALL). In primis verranno presentate le principali definizioni di cosa sia la didattica MALL ed esempi di applicazioni di queste metodologie, evidenziandone i vantaggi e le problematiche rilevati nella letteratura sul campo. In seguito, la tesi andrà ad osservare le tipologie di MALL maggiormente conosciute dal pubblico e ampiamente disponibili sul mercato come *Duolingo*, *Babbel* e *Memrise*, analizzando le funzioni che offrono per l'apprendimento linguistico.

La ricerca descritta in questa tesi ha investigato le percezioni e le esperienze di un campione di 20 soggetti giovani adulti (18-30 anni) ai quali è stato chiesto di sperimentare per tre settimane una applicazione a scelta per apprendere una lingua straniera. Sebbene le applicazioni per apprendere le lingue siano considerate dai soggetti interattive, facili da utilizzare e relativamente motivanti, i dati rilevati dalla sperimentazione hanno permesso di rilevare carenze a livello contenutistico ed attività basilari e ripetitive.

Partendo dai risultati dello studio e dai dati delle ricerche svolte da precedenti autori, la tesi prova a proporre alcune soluzioni metodologiche da includere nelle applicazioni.

Abstract (English)

The thesis focuses on the didactic and motivational potential of certain language learning applications according to Mobile Assisted Language Learning (MALL). First, the main definitions of MALL learning will be presented, along with examples of how these learning approaches are implemented; there will also be a focus on advantages and disadvantages as reported in the literature on the topic. Following this, the thesis will focus on the MALL applications most known by the general public and those that are more widely available on the market, such as *Duolingo*, *Babbel*, and *Memrise*, analyzing what content they can offer for language learning.

The research described in this thesis investigated the opinions and experiences of a sample of 20 young adult subjects (18-30 years old), who were asked to experiment with a language learning application of their choice for three weeks. Although language learning applications were considered by subjects to be interactive, easy to use, and relatively motivating, the data collected from the experimentation allowed to observe a lack in content and activities that were basic and repetitive.

Starting from the results of the study and data from similar research done by other authors, the thesis tries to propose some methodological solutions to use with language learning apps.

Parole Chiave: Dispositivi mobili (Mobile devices), Mobile Assisted Language Learning (MALL), Motivazione (Motivation), Didattica (Teaching), App.

INTRODUCTION

Language learning is a field in constant evolution, capable of adapting and changing to suit the needs of all learners. MALL (short for Mobile Assisted Language Learning) is one of the most prominent realities teachers and learners are often tasked with implementing in their environment. This happens because of either a personal desire of teachers and learners desire to move away from traditional frontal teaching and make lessons more interactive and motivating, or because of external factors. Such was the case with the SARS-CoV-2 pandemic, which forced several learning environments to go online, whether teachers and learners were prepared for it or not.

Computers were already prominent enough in this changing environment, either through personal use in dedicated classrooms or as devices used for educative needs such as dyslexia. But smartphones and tablets have become prominent too, with consequences that school personnel are still tackling with. In Italy, the use of the smartphone in class is a matter of debate, being still discussed or prohibited as of December 2022 (ANSA, 2022). Behaviors related to MALL usage differ according to cultural contexts, ranging from active engagement to reluctant adoption. For example, in Australia students enjoy the flexibility, adaptability, authenticity, enjoyment and pedagogical benefits and digital literacy of mobile learning, while countries like Portugal present learners that are more cautious regarding these technologies. In Asian countries such as Hong Kong, Vietnam and Thailand differences in usage depended according to competitiveness, learning styles, level of anxiety and comfort with technology, and living in rural or urban areas. Learner engagement, considered as students' involvement and active participation in learning activities, has been associated in mobile learning with concepts such as self-identity, image management, perception of learning value and knowledge in relation to their peers, parents and the community at large (Tran, 2020, pp. 21-22).

In this everchanging context, and especially during the pandemic when people had more time to dedicate to leisure activities or needed a distraction, language learning applications have thriven. Opinions on language learning applications vary, but their importance is becoming more and more relevant (Curry, 2023).

Thus, the idea to focus on MALL, and especially on language learning applications. The intent is to understand whether it works, to what extent, and testing its validity in a learning context.

The objective of this thesis was to investigate the didactic potential of MALL and language learning applications, their advantages and disadvantages, and propose some possible improvements in applications development and use.

This has been done both theoretically through analysis of the literature on the topic, and practically through an experimentation.

The first chapter of this thesis will focus on a literature review of academic content on MALL and language learning applications, focusing on what MALL is, its evolution, and the theoretical constructs that form the basis of this approach. The chapter will also provide some examples of MALL and will present an overview on the advantages and disadvantages found in literature regarding MALL use.

The second chapter will focus on language learning applications and provide some examples of functionalities offered by looking at the most known apps found online: *Duolingo*, *Busuu*, *Babbel*, and *Memrise*. The chapter will also consider the characteristics of the learning environment provided by apps and the motivations of adult learners, the main target of this research, in using them.

Chapter three is focused on an experimentation period where a sample of twenty subjects used a language learning application of their choice daily for three weeks. The sample was composed of young adults between the ages of 18 and 30. Young adults were chosen because of the different perspectives they could give about foreign language use and learning, since most of them were either studying or working, in a sort of in-between context. Furthermore, non-formal adult language learning is a relatively unexplored intersection of learning and teaching alike: research on learning with mobile devices is limited in researcher-mediated or teacher-mediated studies (Van der Poorten-Sawyer, 2020, p.17) As such, this dissertation wants to give an overview of independent usage of language learning application, as participants had the freedom to choose applications, language, and could switch them during the experimentation according to their needs and tastes.

The chapter will analyze the results of a series of questionnaires on language learning applications use, divided as such:

1. An introductory questionnaire asking for opinions and previous experiences on MALL and dedicated language learning applications.
2. Monitoring questionnaires: during the experimentation period in which participants were asked to select a language learning application and use it daily to learn a language of their choice. The participants were then asked to complete a feedback questionnaire every three days, for a total of six monitoring questionnaires, with questions asking what

applications the subjects were using, what they were learning, if they employed additional material, and advantages and disadvantages of applications.

3. A final questionnaire collecting opinions on the experimentation and concluding opinions on language learning applications.

Finally, the fourth chapter of this dissertation will attempt to answer the research questions given using analysis derived from the data and further material from the literature, trying to provide ideas for future development of language learning applications.

This thesis aims to contribute to a thriving field of research, and this study is based on theoretical and experimental works by Glenn Stockwell (*Mobile Assisted Language Learning. Concepts, Contexts and Challenges*, 2022), Agnes Kukulska-Hulme, (*Mobile Assisted Language Learning Across Educational Contexts*, edited by Valentina Morgana and Agnes Kukulska-Hulme, 2021), Fiona Van der Poorten-Sawyer (*Use of Mobile Assisted Language Learning among adult non-formal learners: A Complex Dynamic Systems Theory approach*, 2020) and Tran Le Nghi Tran (*Mobile learning for professional development: Significant factors, attitudes, behaviours and engagement patterns*, 2020). This thesis will also attempt to propose ideas for further research.

This thesis is not intended to be a complete guide to MALL and language learning application, nor is it intended to give a definitive answer to an everchanging topic. It might, however, provide some potentially useful insights about a topic that many people attempt to approach or have heard about.

Chapter 1: Mobile Assisted Language Learning and its didactic potential

Mobile Assisted Language Learning (hereafter MALL) is an approach to language learning that is becoming relevant not only academically, but also socio-culturally. The COVID-19 pandemic that is currently ongoing has put technologies for teaching and learning virtually at the forefront of language learning and teaching, as the massive increase in use of platforms like Google Classroom, Zoom, or Google Meetings demonstrates. And yet, the need for these technologies is not reflected by proper academical studies: as Burston (2021, pp. 15-17) reports, most research on MALL is not published on traditional academic outlets, nor is it the subject of many published books. There are several reasons for this phenomenon and underlying them is the great diversity of research interests and the very disparate nature of the journals in which MALL studies appear. The relative recency of MALL still puts it on the edge between an affirmed methodology and a kind of learning environment best suited to accompany more established approaches. In this chapter, the thesis will delve into what MALL is (paragraph 1.1) and the examples of MALL applied to language teaching and learning (paragraph 1.2). The chapter will also consider what MALL could add to the field as a methodology and its advantages (paragraph 1.3) and disadvantages (paragraph 1.4) on a didactic and socio-cultural level.

1.1 Mobile Assisted Language Learning

> "Anytime, anywhere language learning activities undertaken through mobile devices without being limited to a physical location or a determined time" (Kukulska-Hulme, 2009; Kukulska-Hulme; Shiled, 2008 as quoted in Gonulal, 2019, p.309)

> "The learning that occurs in spaces, taking into account the mobility of technology, mobility of learning and mobility of learners." (El-Hussein & Cronje, 2010 as quoted in García Botero et al., 2021, p.69)

> "Language learning which deals with mobile devices and technology." (Sutrisna; Ratminingsih;Artini, 2018 as quoted in Nariyati et al., 2020, p.39)

> "It is the owner that is mobile. […] Learners opportunistically appropriating whatever technology is ready to hand as they move between settings, including mobile and fixed phones, their own and other people's computers, as well as books and notepads." (Sharples et al., 2005, as quoted in Tran,2020, p. 15)

> "MALL refers to learning a second or foreign language through the use of one or more of variousmobile devices including, but not restricted to, mobile phones

(including smartphones), tablets, personal digital assistants (PDAs), MP3/MP4 players, electronic dictionaries and gaming consoles." (Stockwell, 2022, p. 8)

These are only part of the definitions found in the literature for Mobile Assisted Language Learning and, although this concept might appear nebulous at first glance, the constant presence of technological devices in people's daily lives help understand what MALL entails. This chapter will start by considering the theoretical approaches that describe MALL and its functioning.

1.1.1 The origins and CALL

The origin of most of MALL lie in CALL, acronym for Computer Assisted Language Learning, a methodological approach which emerged at the beginning of the 1980s. CALL theory has been defined in the literature as (Stockwell, 2022, p. 97):

> "The set of perspectives, theoretical models, frameworks and specific theories that offer generalizations to account for phenomena related to the use of digital technology in the pursuit of language learning objectives; ground and sustain relevant research agendas; [and] inform effectiveCALL design and teaching practice."

CALL development occurred in three stages (Hockly, 2016, as quoted in Almousawi, 2021, pp.166-167):

- Behavioral/Structural CALL: entails fundamental engagement interactions and decontextualized practices between the learner and the computer. Language is seen as a structural system of grammar, vocabulary, and pronunciation.
- Open CALL: permits more complex and sophisticated engagement between the learner and the computer. Language is seen as being taught for communicative purposes, emphasizing that grammar, for instance, should be thought implicitly rather than explicitly.
- Integrative CALL: marked by the utilization of multimedia computer capabilities and the Internet. This approach utilizes computers and technology for communicative purposes and emphasizes a socio-constructivist view of language learning, placing language use in an authentic context, including learning through social interactions and exposure to authentic materials.

A branch of CALL worth noting is Computer Assisted Pronunciation Training (CAPT), defined as (Rostron & Kinsell, 1995 as quoted in Tran, 2020, p.11):

> "[…] the employment of digitized speech for developing language pronunciation."

CAPT supposedly provides benefits related to a private, stress-free environment for learners to practice their pronunciation at their own pace, with virtually unlimited access to input and individualized, instantaneous feedback. One of the most valuable technologies for CAPT is Automatic Speech Recognition (ASR), which has been useful for improving learners' pronunciationin both segmental, suprasegmental, overall intelligibility, learners' confidence and autonomy. However, ASR has been found to be less accurate than human analysis, ineffective in recognizing accented speech, and unable to provide meaningful evaluation of pronunciation (Tran, 2020, p.11).

1.1.2 M-Learning

A relevant phase in the evolution of MALL is that of mobile learning (hereafter m-Learning), defined as:

> "Learning through mobile terminals, learning with students that are on the move and learning through mobile content" (Taylor, 2006 as quoted in Arvanitis, Krystalli, 2021, p.14)

> "Any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of learning opportunities offered by mobiletechnologies." (O'Malley, 2005 as quoted in Arvanitis, Krystalli, 2021, p.14)

M-learning is characterized by portability, social interactivity, context sensitivity, connectivity, personalization, and the ability to be spontaneous and ubiquitous. The m-Learning framework is usually exemplified with this graph by Kearney et al. (2012, as quoted in Van der Poorten-Sawyer, p. 42):

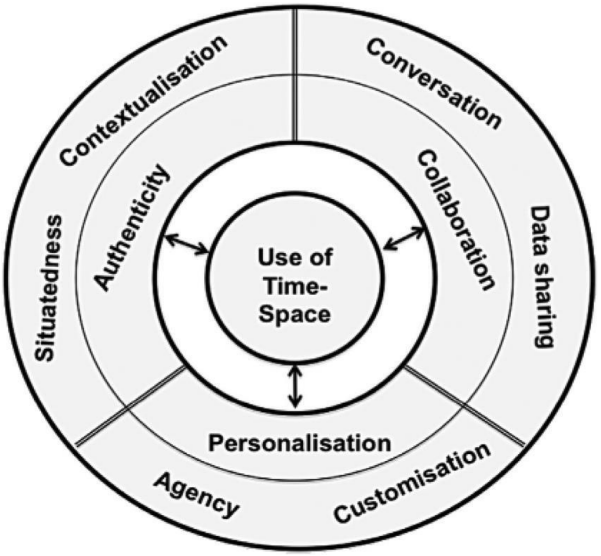

Figure 1: Kearnery et al. m-learning framework (2012)

As can be seen in Figure 1, authenticity, collaboration, and personalization directly interact with the use of time-space by the learners and vice-versa. These main five concepts are related to six others: agency, customization, data sharing, conversation, situatedness, and contextualization. These six external factors contributeto the creation of the three main internal constructs (Situatedness + Contextualization = Authenticity, Conversation + Data Sharing = Collaboration, and Agency + Customization = Personalization). The framework was created with the intent to assist teachers in pedagogy and evaluation. In general m-Learning is a process of knowing thanks to conversation with people through personal interactive technologies, with a focus on the context in which the conversation happens (Viberg, Grönlund, 2012, p.1).

1.1.3 CALL and MALL

In order to differentiate CALL and MALL, both of which employ sophisticated electronic devices, itis important to consider the differences between mobile devices and computers and how they have been used by learners. The potential uses of an artefact are called affordances and are divided in five categories (Stockwell, 2022, pp. 27-28):

- Designed affordances: they are built into the artefact by the developer and support the use of the artefact as it is expected to be used.
- Improvised affordances: they are not recognized or intended by the developer but are found by the user while using the artefact.
- Emergent affordances: changes to the environment itself as a result of the artefact. Emergent affordances are not expected by both the developer and the users.
- Technical affordances: they describe the functions of a device and may include the designed affordances.
- Socio-materiality: the relationship between an artefact and the social context in which it is inserted; the material and the social may never be separated, as users are shaped by the artefact and vice versa.
- Mobile learning is related to the devices used, but it could be useful to reflect on the learning process as well: with MALL, learners are capable of using learning tools anywhere and anytime (Vavoula, Sharples, 2002, as quoted in Moron, 2019, p.10).

- It is also important to consider the capabilities of modern smartphones, which include all computer capabilities and functions, rendering certain aspects of CALL obsolete or unnecessary (Han, Keskin, 2016, as quoted in Moron, 2019, p.10).

1.1.4 Factors characterizing MALL

Some of the aspects that characterize mobile seamless language learning are (Tran, 2020, p. 39):

- Encompassing formal and informal learning
- Encompassing personalized and social learning
- Learning across time
- Learning across locations
- Ubiquitous knowledge access (a combination of context-aware learning, augmented reality learning and ubiquitous access to online learning resources
- Encompassing physical and digital worlds
- Combined usage of multiple device types (including "stable" technologies such as desktop computers, interactive whiteboards)
- Seamless and rapid switching between multiple learning tasks (such as data collection + analysis + communication)
- Knowledge synthesis (prior and new knowledge as well as multiple levels of thinking skills, and/or multidisciplinary learning)
- Encompassing multiple pedagogical or learning activity models (facilitated by the teachers)

The quality of a mobile learning application and its ability to satisfy stakeholders is exemplified and improved upon in Sarrab's Technical Quality Model (Tran, 2020, p.40):

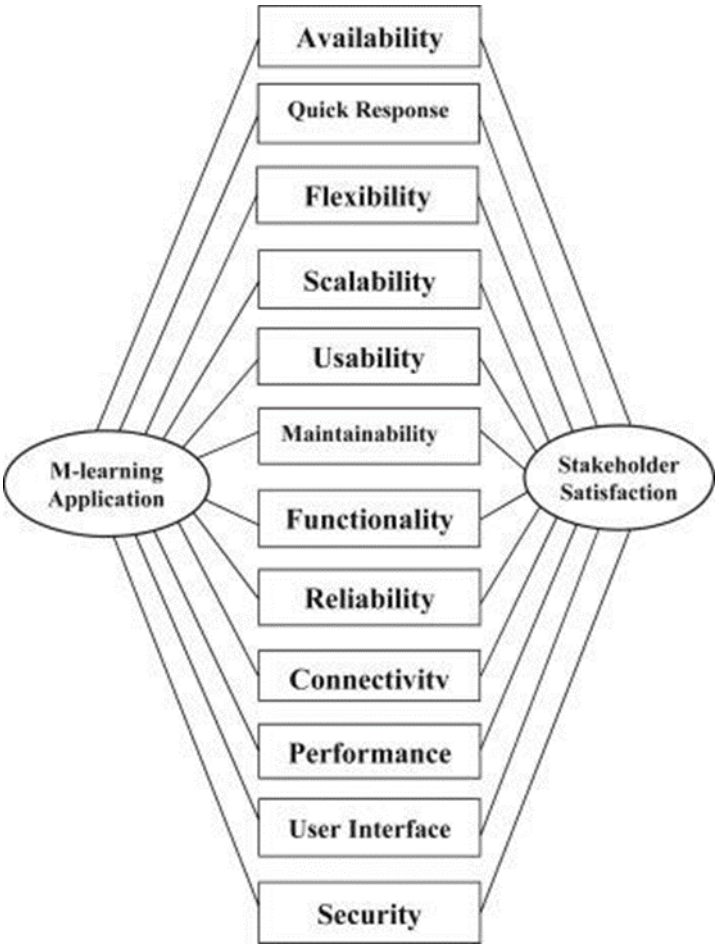

Figure 2: The Technical Quality Model by Sarrab et al. (2016)

The model seen in Figure 2 focuses on which criteria are the best for quality selection of mobile language learning tools, which lead to user satisfaction and motivation in tool use. MALL, as will be delved into later in the chapter, is applied when there is enough user belief and a positive attitude towards technology. The strongest predictors of mobile learning adoption are considered perceived usefulness, personal innovativeness, and learners' attitude (Tran, 2020, p. 16). Several factors related to mobile learning adoption can be found in the literature: Hamidi and Chavoshi (2018) identified ease of use, trust, character and personal qualities, context, perceived usefulness, behavioral intention, and culture of use. Rogers (2010) focused on perceived attributes of innovations, i.e., related advantage, compatibility, complexity, trialability and observability; the study also focused on types of innovation-decision, communications channels, nature of the social system, and extent of change agents' promotion efforts. Finally, Shroff and Keys (2017) identified perceived competence, challenge, choice and interest (Tran, 2020, pp.16-17). Four macro groups of factors were also considered: technological factors, pedagogical factors, social factors, and individual factors

(Tran, 2020, p.18).

These factors can influence each other. As Hamidi and Chavoshi claim (Tran, 2020, p. 18), context can positively influence ‘ease of use’ (how easy it is to use a tool) and ‘usefulness’ (the degree of usefulness an individual will give to the tool). ‘Student readiness’ (the degree of preparation done by the learner in terms of content and methodology) was also found to have a positive effect on ‘usefulness’ directly, and ‘service quality’ and ‘commitment’ influenced both ‘usefulness’ and ‘ease of use’. Other factors related to participation include access to a tool, support and motivation, participation and collaboration with other users or tools, feedbacks given, construction of reflection on content and knowledge studied or system quality, interaction with the system, and compatibility (Change et al., 2015 as quoted in Tran, 2020, p. 163).

Connected to this is a new acronym found in the literature, MALU, which adds the element of “use” instead of “learning”. Students use the mobile technology to produce linguistic content instead of simply learning from a specific technology. Achilleos and Jarvis (2013) defined MALU as:

> “A non-native speakers using mobile devices to access and or/communicate information on a regular basis for a range of social or/and academic purposes in an L2. […] MALU is more concerned with context rather than the language itself, which involves meaningful interactions.” (Almousawi, 2021, p. 167)

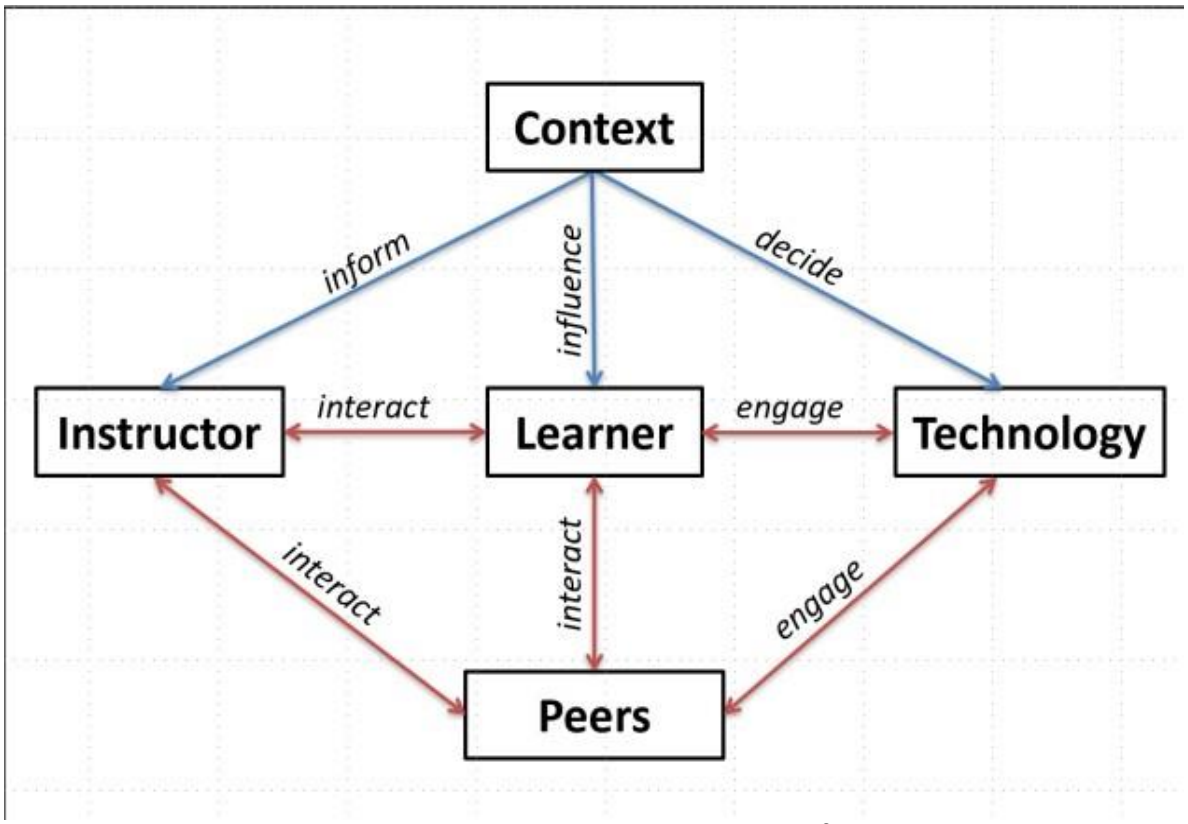

Figure 3: Relationship between social interaction and learning factors (Tran, 2020, p.167)

Figure 3 shows the relationship among success factors for mobile learning and personal interaction factors.

It is clear that a given group of factors can have an influence on the others and interact with them differently. The personal context-related factors influence the learners' motivation and behavior, inform the teacher's design and delivery of learning and help both the teacher and the learner to decide on which technology to adopt and how to engage with it actively. Factors like technical support or device problems can influence the learners' engagement and commitment; the interaction between learner and their peers has an impact on learner-related factors, such as confidence and peer-related ones likepeer learning; and while the teacher facilitates learners' discussion and self-correcting, this interaction affects factors such as commitment and feedback (Tran, 2020, p. 167).

Acceptance models are employed to better analyze how different technological approaches can be considered by audiences. While the concept is mostly applied to technologies in general, this thesis will analyze acceptance models as a way to integrate MALL. The most common acceptance models found in the literature are the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology(UTAUT).

The Technology Acceptance Model, first introduced by Davis (1986, 1989), was derived from the Theory of Reasoned Action and was designed to predict technology acceptance based on the constructs of perceived usefulness, perceived ease of use, attitudes and behavioral intention. The model can be represented following this schema (Azli et al., 2018, p.86):

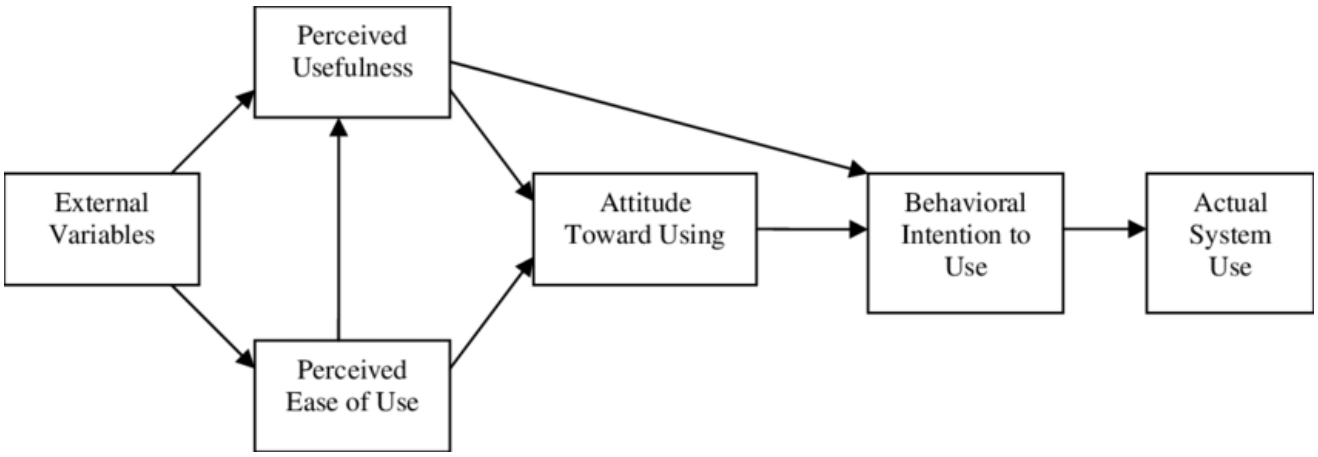

Figure 4: The Technology Acceptance Model, showing how user behavior can be influenced by a variety of factors when approaching and choosing a technological tool.

As shown in figure 4, an individual's behavioral intention to adopt a system is determined by two beliefs: perceived usefulness, defined as the degree to which an individual believes that using a particular system wouldenhance their productivity, and perceived ease of use, defined as the degree an individual believes that using a particular system would be free of effort. Cognitive, affective, and social needs can be seen as predetermining factors of perception. The TAM model was later updated and improved uponby Venkatesh et al., until the TAM 3 model (Van der Poorten-Sawyer, 2020, pp. 44-47):

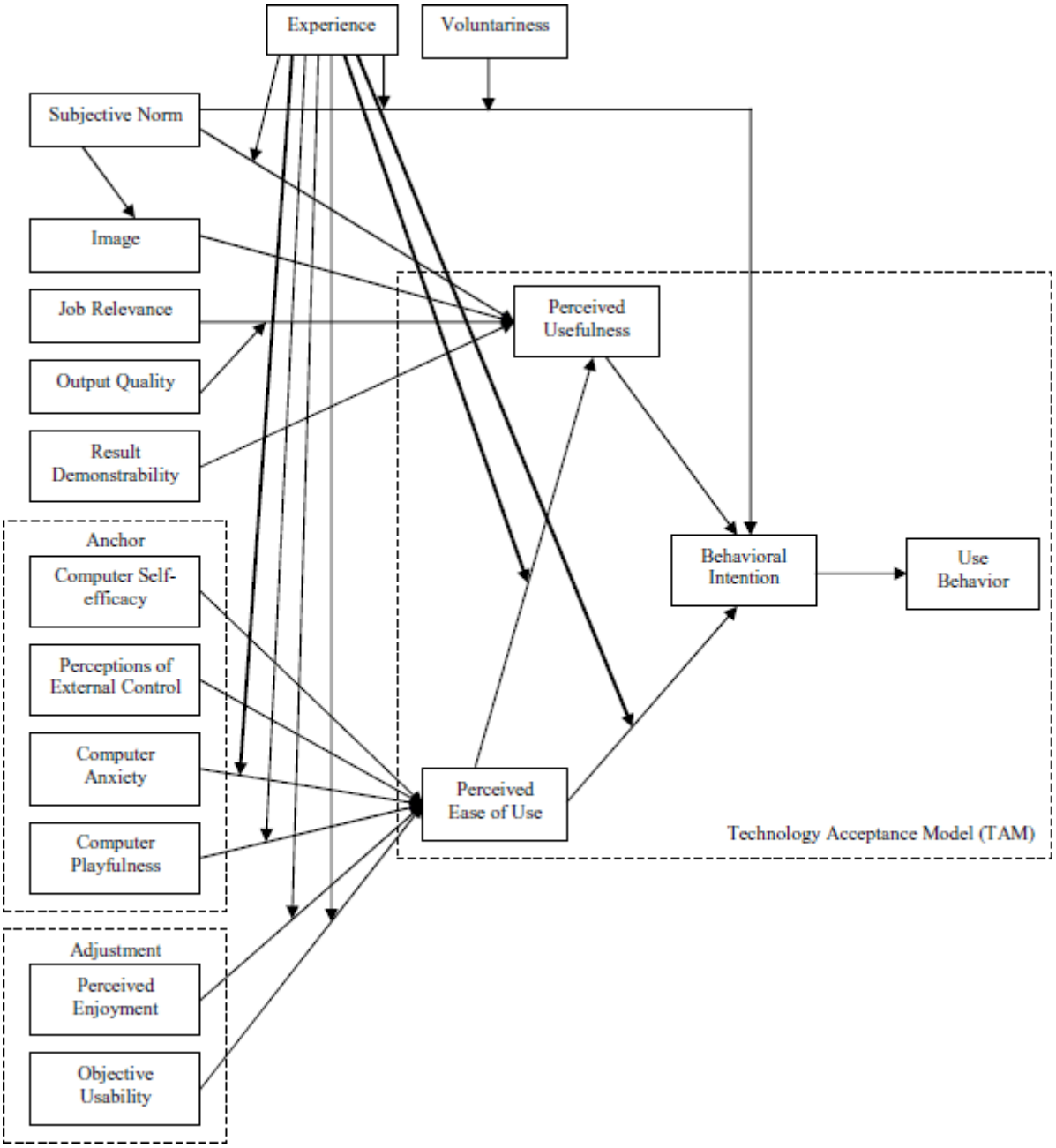

Figure 5: The Technology Acceptance Model 3 model, showing how user behavior can be influenced by a variety of factors when approaching and choosing a technological tool.

In contrast with Figure 4, among the new concepts included in the Figure 5 model are "subjective norms" (i.e., the social pressure perceived by a subject to perform a behavior or not), job relevance, image, output quality and resultdesirability. The concept of *anchor* includes elements considered as psychological determinants, which might strengthen or weaken perceptions about the easiness of tool usage: perception of external control, computer self-efficacy, computer anxiety and computer playfulness.

The concept of adjustment alludes to how the previously mentioned perceptions can shift according to perceived enjoyment of tool usage and an objective look at the time spent using the tools. As previously mentioned, the UTAUT model, theorized by Venkatesh et al., is also employed to explain behavioral intention.

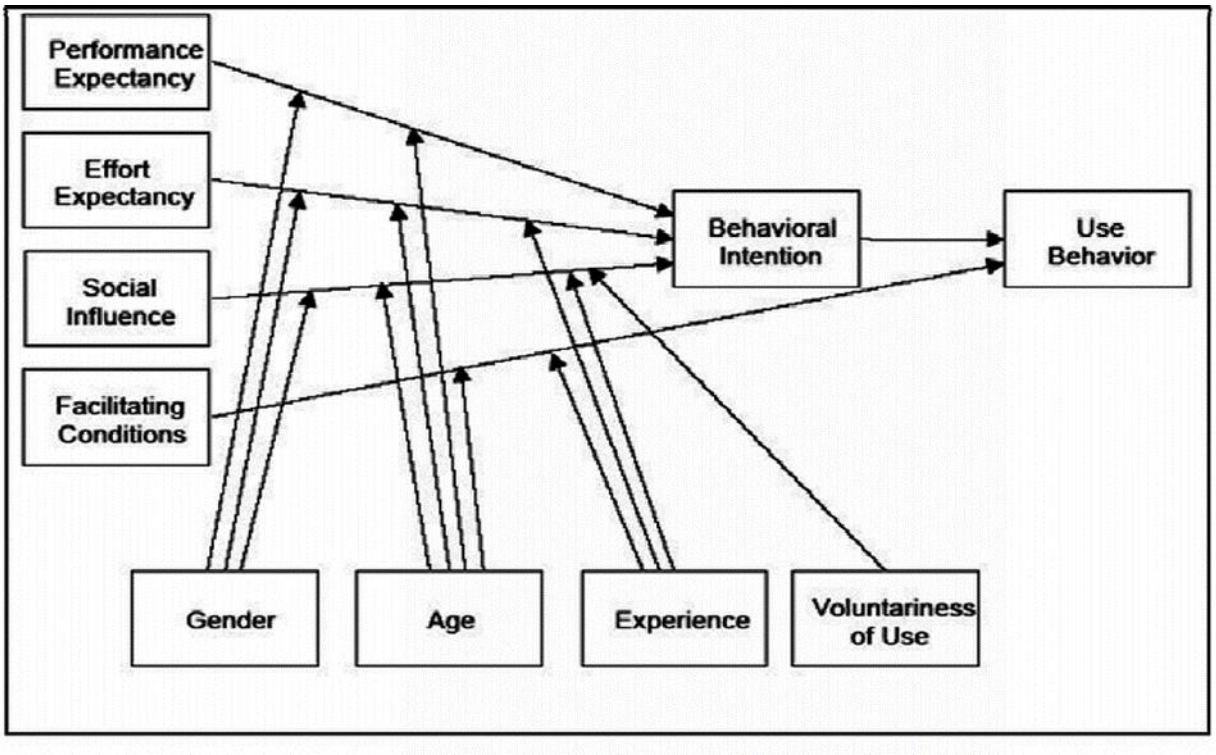

Figure 6: The Unified Theory of Acceptance and Use of Technology Model (UTAUT) model, employed to understand what factors lead to behavior in choice and use of a technological tool.

As can be seen in Figure 6, the four constructs that compose the UTAUT model are (García et al., 2021, pp.70-72):

- Performance Expectancy: defined as the degree to which an individual believes that using thesystem will help them attain gains in job performance.
- Effort Expectancy: the degree of ease associated with the use of the system. Perceived ease, complexity and ease of use are constructs from other models that pertain to effort expectancy.Effort expectancy is also considered a strong predictor of behavioral intention for older users,as technical knowledge may be needed to operate certain devices, applications, or sites.
- Social Influence: the extent to which an individual considers important that others

believe they should use the new system. García et al. focus on teachers' use of technology quotes Aubusson (2009) by stating how teachers and students have a relationship of mutual influenceconnected to the social sphere: teachers share their knowledge and have practical experiencethat allows them to consider whether a technology might work or not, while students are characterized by spontaneity, immediacy, honesty and ability, with the capacity to influence their teachers' learning and empower themselves in the use of mobile technologies, thus rendering them an active part of learning.

- Facilitating Conditions: individual beliefs that an organizational and technical infrastructure exists to support the use of the system. The notion of facilitating conditions is also explored in models such as the Theory of Planned Behavior, and they directly influence behavior.

What completes the UTAUT model are Behavioral Intention (theorized to have a significant positive influence) and Use Behavior, i.e., how something is used by the subjects (García et al., 2021, p.73). A behavioralanalysis proposed by Sheeran (2002) can also apply to this model, that of Inclined Abstainers and Disinclined Actors. The former are participants with positive intentions who fail to act accordingly, while the latter are participants who perform a certain behavior despite less positive intentions to doso. When it comes to MALL usage, participants might be Inclined Abstainers because they procrastinate in MALL implementation or because MALL doesn't fit with an institution's existing practices, or teachers might find it distracting to use mobile devices in the class. The appearance of Disinclined Actors might happen because of social pressure on mobile learning implementation, either on the students' part or at an institutional level, which can be time consuming and can cause information overload (García et al., 2021, p. 84).

The UTAUT Model has been revised in a form called UTAUT2, which includes concepts such as hedonic motivation, price value, and habit, with individual differences in age, gender, and experiencehypothesized to moderate their effects on behavioral intention and technology use (Tran, 2020, p. 17).

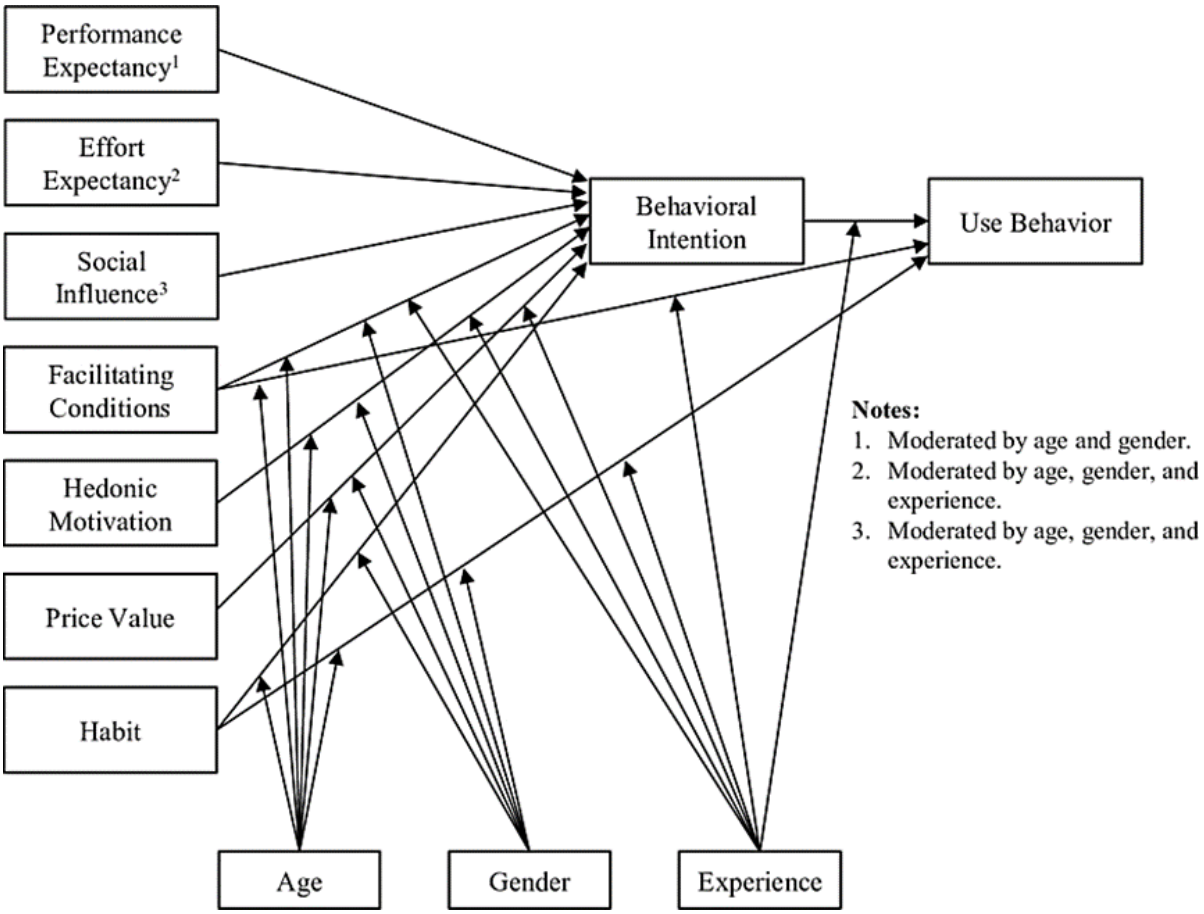

Figure 7: The UTAUT 2 Model, employed to understand what factors lead to behavior in choice and use of a technological tool.

The additions present in Figure 7 were included to enable a better explanation of why familiar products are continually used (Van der Poorten-Sawyer, 2020, p. 48). This model has not been exempted from criticism. For example, the relations between the elements of the model are not so direct: upon seeing the price value of a given technology, one could consider social influence before acting a behavioral intention;facilitating conditions, social influence and concerns about privacy do not influence sharing of content through social networks (Herrero et al. 2017, as quoted in Van der Poorten-Sawyer, 2020, p. 49). Hedonic motivationis not related to age, gender, or any other element which might clarify where it comes from. The importance of social influences, development of mindset to form performance expectancies and where effort expectancy originates are not shown. And because the model is static and does not represent episodic learning, serendipitous encounters and unpredictable triggers are not shown. The UTAUT 2 model represents (Wu, Kuo, 2008 as quoted in Van der Poorten-Sawyer, 2020, p. 50):

> "A shift in focus in the literature from information system factors that drive initial implementation of technology to those which determine who become habitual and long-term users."

Habitual and long-term learning is a kind of continuous usage that involves a type of engagement that occurs spontaneously with little conscious effort. For language learners, the same factors which drivethe continuous usage of a technology are important (e.g., language study goals, learning systems, how study patterns are maintained).

García et al. (2021, p.73) add another element to the UTAUT model, which is Attitude Towards Behavior, defined as such :

> "Attitude is defined as the positive and negative feelings about performing the target behavior and the individual's overall reaction to using a system."

García et al. found that attitude is a determinant variable on behavioral intention, especially on the part of the teachers, when it comes to technology use.

The following table includes factors that can influence participation (being an active user of mobile learning), retention (i.e., keeping use of mobile learning constant) and dropout, i.e., abandoning mobile learning (Tran, 2020, p.19).

Studies	Factors affecting participation, retention, and dropout in mobile learning
Awidi et al., 2019	Access to information and resources, support and motivation, participation and collaboration, assessment and feedback
Hart, 2012	Satisfaction, sense of belonging to the learning community, motivation, peer and family support, time management skills, increased communication with the instructor
Dong et al., 2014	Perceived usefulness, outcome
Aragon and Johnson, 2008	Gender, academic readiness, number of courses enrolled
Street, 2010	Personal factors (i.e., self-efficacy, self-determination, autonomy, time management skills), environmental factors (i.e., family, organizational and technical support), course factors (i.e., relevance and design)

Table 1: factors affecting participation, retention, and dropout in mobile learning.

The challenge to understand user behaviors and factors presented in Table 1 in a constantly evolving learning environment influences the creation of models which entirely focus on usage, such as the Complex Dynamic Systems Theory (CDST) by Larsen-Freeman (1997). The theory considers the elements of a given environment as self-organizing and coalescing into more complex, larger, and constantly changing systems. Variables in the system are countless, varying, and interconnected. The scale of change cannot be predicted, nor can its triggers, and contradictory conditions can be accommodated, as the system is focused on individual experience. CDST can account for why and how certain events in part of a learner's life can affect their learning. It also helps understand how issues, which impact certain students in specific ways, do not affect others as much. Thus, personal concerns and issues can be considered to help individuals, but also understand groups and predict experiences that can help achieve better outcomes. An aspect of learning such as motivation could be represented through CDST in different time stages and different levels of intensity. In order to define CDST (Van der Poorten-Sawyer, 2020, p. 55):

> "According to CDST, the learners' life itself may be understood as an "eco-social system". The central premises of this theory, then, conceive of learners themselves as a system

> comprising many interacting elements. CDST emphasizes the interrelationships between people, tools, and ideas. In this way, learner growth and change when viewed through a CDST lens is depending on fluctuating, interdependent movements within and without the learner's self."

A foundational aspect of CDST is the presence of recurrent attractor states, defined as temporarily stable states resulting from continual feedback loops. Attractor states can be considered according to their speed (how long they last), duration (how secure they are), and resistance to various perturbations. Learners can experience these states themselves by reaching psychologically constraining or empowering states of engagement with the tools used (Van der Poorten-Sawyer, 2020, p. 157).

CDST is also inserted in the context that provides the environmental frame for the system. This can happen when researchers consider the following aspects (Van der Poorten-Sawyer, 2020, pp. 56-57):

- The Micro system: it encompasses human relationships, interpersonal interactions and immediate surroundings.
- The Mesosystem: it focuses on infrastructures; here the effect of resources and technology is often seen, and here individuals make connections.
- The Meso-level: the community existing in contrast to the larger world in which the individual moves.
- The Macro system: it incorporates the bigger global, social and cultural forces, values, economics, political systems and norms.

Attractor states and systems can have an influence on app and MALL usage that is unique to each individual according to a range of factors, including job demands, social relationships and other socio- economic challenges and opportunities. Learner micro attitudes about themselves and their learning are shaped by meso-level engagements with apps and resources, along with the macro world in which the learners operate. Continuation in usage can be affected by factors and micro elements such as metacognitive understanding. Meso-level factors include usability, along with macro features pertaining to socio-economic elements such as tool affordability. Elements such as job demands, holidays, and appearance of frustration can lead to disengagement (Van der Poorten-Sawyer, 2020, p. 158).

In short, the factors influencing learner experience can be summed up with the following diagram:

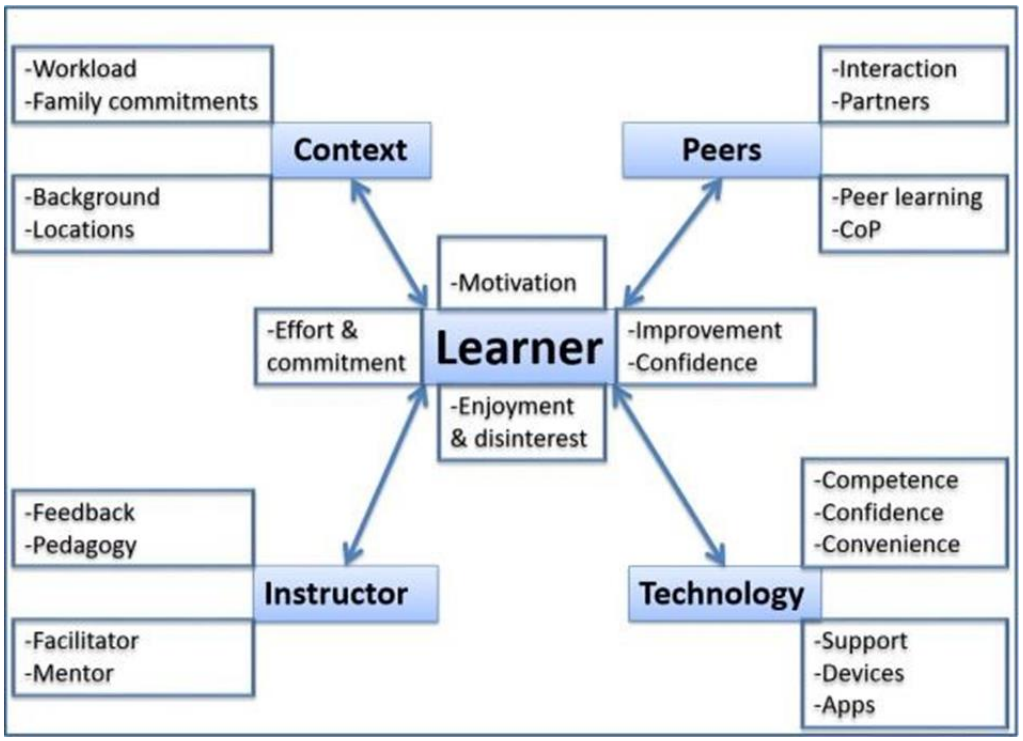

Figure 8: Factors influencing learner experience divided into categories. (CoP = Community of Practice, Tran, 2020, p. 85)

1.1.5 Cognitive Load Theory

Another theory that can apply to MALL is Cognitive Load Theory, first theorized in the 1980s by Sweller and further explored by Paas et al. (2003). (Ozer, Kılıç, 2018, p.2916)

> "Cognitive Load Theory is concerned with the conditions under which learners can best absorb and retain new information without overwhelming their limited short term memory resources."

Learners rely on schemas to deal with complex problems. If those schemas are not acquired by the learner, or the instructional procedures were poorly designed, working memory will not be able to successfully retain the notions provided, effectively hindering learning. The cognitive load of learners can be a good indicator of the efficacy of new teaching methods or learning technologies, and that applies to MALL: mobile applications in particular have the possibility to alleviate cognitive overload by allowing the user to select the length of each learning session (Ozer, Kılıç, 2018, p.2916).

1.1.6 Authentic Environment

Finally, a concept that strengthens the usage of MALL, is that of Authentic Environment, considered as a prerequisite for effective learning. An Authentic Environment entails the following characteristics (Shadiev et al., 2017, p. 285):

- Emphasizes meaningful learning in contexts that involve real-world problems and how knowledge will be used in real life.
- Provides authentic activities that have real-world relevance, ideally through tasks that need to be completed over a sustained period of time.
- It creates an opportunity for sharing learning experiences and accessing the experiences of learners regardless of their level of expertise.
- Promotes reflection and enables authentic learning assessment within the tasks.
- It typically employs familiar and relevant situations from the learners' background, usually with places that learners frequently visit.

Authentic Environment learning through MALL also follows the concepts of scalability (the ability of language-learning programs to be adapted in a wide variety of contexts and an initiative to act) and sustainability (the ability of language-learning programs to remain in use and how well the results fit the intended setting) (Shadiev et al., 2017, p.286). Not all environments are equally authentic, though:

> "Classroom environment is much different that outside; classroom has much less [sic] real objects and students are less likely to experience a wide variety of real-life problems that they are able to experience outside [sic]. On the other hand, what we learn in a zoo or in a foreign city may not be so useful for our everyday life, because we visit such places less frequently and objects and problems there are quite different from our daily life." (Shadiev et al., 2017, p. 295)

Considering this quote, an optimal Authentic Environment might be a university campus, the local community the learners live in, or even one's own home. Another aspect to note is giving learners increasing flexibility in choosing places and objects for language learning, moving from an instructor- centered approach to the teacher being a facilitator of learning in a student-centered environment, guiding the learners through scaffolding of notions. Learning in authentic environment can also be an interesting opportunity for interdisciplinary learning, applying methodologies like CLIL (Content and Language Integrated Learning) to interactive language learning (Shadiev et al., 2017, pp. 296-298).

1.1.7 MALL in Second Language learning contexts

MALL can also be studied along with Second Language Acquisition theories, such as (Almousawi, 2021, pp. 168- 169):

Behaviorism	Second language learning is viewed as the development of a set of new habits, and learners associate between words and objects or events when they receive linguistic input. The theory can be employed in MALL when linked to concepts such as receiving notifications, gamification elements (i.e., keeping a streak of daily use on Duolingo), or receiving praise from the tool when doing something right.
Cognitivism	It emphasizes that the mental process we use for our general cognitive function to learn anything in life is the same as with language. Learners use their mind to find or notice patterns, deducing information and analyzing language in order to acquire language. In MALL, the theory can be applied to online activities done to understand a specific topic, or using tools such as a cloud server to store previous files and using them for working on a new topic
Inputism	The i+1 theorized by Krashen. L2 acquisition is completely input-driven, and output does not necessarily enhance L2 acquisition. Being exposed to enough comprehensible inputs results in acquisition of second language. In MALL, the theory can be employed for exposure to new topics, e.g., through a subtitled dialogue. The context provided by the sentence can be used to infer the meaning of previously unknown content.
Interactionism	Language acquisition is best acquired through modifying learners' output while negotiating meaning. For example, a teacher correcting a mistake made by a student is an opportunity to learn through interaction and to notice things related to language use, leading to intake of information. In MALL the concept can be seen in written and oral chats, where meaning is often negotiated between two language learners trying to learn the other's native language.
Socio-Constructivism	This theory derives from Vygotsky's Zone of Proximal Development, and highlights that an individual's learning takes place because of their interactions in a group, and learners are involved in their own learning process. The interaction between learner and environmental factors establishes linguistic knowledge. Learning should occur in realistic settings and through students' actual experiences. This theory could be applied to MALL through the sense of belonging to a global learning community in forums, or through indirect interaction with other learners by sharing content, using activities created by other users, or through scoreboards showing what other users learned and their progress.

Table 2: The most known Second Language Acquisition theories and how they can be employed and observed in a MALL approach.

1.1.8 Learner Profiles

An interesting concept that might be researched further when developing language learning applications is that of learner profiles. Tran Le Nghi Tran made this topic one of the foci of her thesis, and it describes how learners may use language learning applications. In her study on mobile learning for professional development, Tran discovered three kinds of attitudinal patterns towards self-directed MALL: curious participants, critical participants and keen participants (Tran, 2020, p. 112). Curious participants only engaged with the apps for a few times and then gave up due to loss of interest or impatience, while keen participants reported spending much more time interacting with mobile technologies, finding them useful or because of a sense of achievement. Changes in attitude were related to participants' behavior, defined as the manner in which participants reacted to mobile technologies. Changes in behavior led to variations in engagement levels, with engagement defined as the degree of interaction with apps for self-directed MALL. (Tran, 2020, p. 113). These changes are reflected in the concept of learner profiles, defined as (Tran, 2020, p. 28):

> "[…] Considering differences so that learners can be provided with personalized resources and feedback that fit their characteristics and situations."

In the literature, two major approaches have been considered as basis for learner profiling: person-oriented profiling, i.e., cluster analysis or laten analysis of a sample, and technology-based profiling, i.e., collecting learners' information automatically generated by algorithms. A different approach was proposed by Becking et al. (2004), which considers learner profiles as a collection of technical information on devices and tools and didactic information related to the user's learning history (Tran, 2020, pp. 28-29). Another proposal was that of Alexander and Murphy (1999), considering sub-groups of learners with shared cognitive and motivational patterns within learner communities that organize learning environments and individual learning.

Taking into consideration motivation and learning strategies as the main factors, different learner profiles have been defined in the literature: Yamamori, Isoda, Hiromori and Oxford (2003) based their learning profiles on learning strategies use, desire to learn, and achievement levels, dividing users into high and low achievers. Sardegna (2012) divided learner profiles based on shared characteristics, such as motivation (Unmotivated), performance (Overachievers and Consistents), or engagement (Hardworkers and Misusers). An important study on learner profiles was headed by Dörnyei (2014), who identified four learner types based on cognitive styles (Divergers, Convergers, Assimilators and Accomodators), further dividing second language learners into groups based on their

preferences and learning styles: visual, auditory, kinaesthetic, and tactile groups (Tran, 2020, pp. 31-32). In particular, focusing on degrees of technology use, a very interesting classification of learning styles came from Lintunten et al. (2017, cited in Tran, 2020, p. 32):

- The Digiage (heavy users of social media, but not necessarily for learning)
- The Hybrid (have used technologies with critical conscience for in-and-out-of-school learning)
- In-School Learners (have used technologies, but do not believe they necessarily facilitate the learning process)

Other researchers have profiled learners based on different components, such as language aptitude, literacy skills, vocabulary and listening skills. Other factors considered include metacognition, cognitive strategies, self-efficacy, self-motivation, willingness to communicate, and intrinsic value.

The following table displays the kinds of learner profiles Tran selected along with their main characteristics during MALL use (2020, pp. 115-152).

LEARNER PROFILES	**CHARACTERISTICS**
The Tasters	Short interest span, little engagement, easily give up, try-and-quit behavior, may need pushing, may have had negative experiences with MALL technologies, might need motivation and instructors and reminders to keep engaging with learning
The Players	Mood-dependence, enjoyment and achievement-focus, high engagement, possible addiction, positive attitude toward learning with technology, balance between learning and playing
The Steadies	Instruction preferred, moderate engagement, critical and not too persistent, sense of responsibility as a learner, intrinsic motivation for improvement
The Hard-Workers	High engagement, strong motivation, much persistence, large amounts of work, self-directed learning ability, material checked and watched multiple times,
The Perfectionists	Very high engagement/commitment, completion of all given tasks, desire for best results, selective in their choices in order to succeed

Table 3: Learner profiles according to Tran (2020)

There are different degrees of proximity among the profiles described in Table 3, and learners may move to another profile or intersect with one according to personal taste, technology and personal motivations. To quote Tran (2020, p. 189):

> "Due to the complexity of human attitudes and behaviors, individuals did not always fit neatly into a particular profile […]"

Understanding the characteristics of learner profiles and how to adapt learning to each profile

is a task that might lead to higher engagement with language and increased motivation. In her thesis, Tran gave the following suggestions for improving learning for each profile.

For learners such as “the Tasters”, their learning might be improved with careful scaffolding of learning instructions, providing bite-sized learning. Working accordingly to offer them optimal time scheduling and workload management was also suggested. Instructors and teachers should be strategic with timing to provide learning in less busy times, with prevision of quality material being used (Tran, 2020, p. 123).

For learners such as “the Players” it would be useful to provide daily instructions as a starting point and foundation, adding more games and challenges to learning to make it more appealing. Having real-time interactions with peers and teachers could help them stay on track and engage when they are not in the mood for learning, or their motivation is waning. (Tran, 2020, p. 137).

For learners such as “the Steadies”, Tran suggested giving daily instructions, obligatory tasks, more tests and assessment tasks to help them engage more often with content. Involvement of instructors and peers was felt as critical for participation (2020, p. 130).

For learners such as “The Hard-Workers” minimal instructions were required, letting them explore learning on their own and providing support from peers and teachers when they could not deal with the issues they have by themselves (Tran, 2020, pp. 144-145).

For learners such as “The Perfectionists”, Tran suggested providing only highly relevant content and technologies, setting reasonable amounts of work and giving strategic scaffolding of learning, ensuring that they have a positive learning experience with mobile technologies, but do not become overwhelmed. Open-ended guidelines may provide them with a starting point from which they can flexibly self-direct their learning and decide to focus on the work they have completed, trying for the best results possible. To sustain their learning ensure that positive experiences, enjoyable results and flexibility of learning with technologies are present (Tran, 2020, p. 152).

The suggestions indicated for each learner profile include factors that may need to be considered when working on the concept of designing MALL tools.

1.1.9 Design of MALL environments

Design in MALL should include three distinct elements:

a. design of the learning environment: which might be face-to-face, blended or distance learning, and designed through many approaches.

b. design of the artefacts: using for example Human-Computer Interaction (HCI), which advises designers of considering who the users are, when and how will they use the artefact to create an interface that will facilitate interaction between technology and user.

c. design of the tasks for the learners: Tasks should be meaning-centered, modifiable, flexible, include a gap which needs to be addressed, require learners to use their own language resources, and have a clearly defined end (Stockwell, 2022, pp. 149-150).

In general, MALL design should follow these main principles (Stockwell, 2022, pp. 166-172):

1. **Understanding the context**: this includes knowing the learners, their skills, preferences, learning styles and habits, what devices are owned, and learners' will to engage in MALL activities.
2. **Becoming familiar with available resources**: consider the quality of MALL material, if it is a computer-based interface or a mobile interface, if learners need to pay for it or not.
3. **Making the most of the affordances of the device**: accounting for inclusion of multimedia, interactivity, and portability, along with technical functions such as cameras, music and video players, GPS, or Internet browsing.
4. **Setting feasible learning goals suitable for mobile devices**: considering if locations are ideal for focusing on tasks.
5. **Predicting technical problems and preparing support**: ensuring that there is a backup plan to deal with problems that may arise or means of immediately supporting problems that occur, rather than dealing with them after they have occurred. Problems may provide a negative image of MALL learning and discourage learners, causing reduced motivation, or even causing attrition.
6. **Preparing learners adequately**: training learners towards self-directed learning, using mobile devices outside of class.
7. **Allowing for alternatives**: providing tasks and activities adaptable for most devices and independent of the sophistication of the device or operating system, or alternatives to mobile learning that enable learners to select what is best for them

depending on learning preferencesand circumstances; it is important not to force learners towards a specific methodology, but to show them the benefits provided and allow them to make a choice of their own volition.

8. **Understanding the impact of non-learning uses**: understand learners' expectation towardsapp usage and their behavior while using MALL tools to create activities.
9. **Dealing with distractions**: minimizing the potential waste of time and effort, provideactivities which can be completed in microsegments and give learners the option to see whathas been completed and what is not.
10. **Opening channels of communication**: active and efficient teacher-to-student communication.
11. **Experiencing MALL as a learner**: this could be useful in order to understand problems thatmay arise and comprehend the difficulties of learners.

1.2 Examples of Mobile Assisted Language Learning

MALL technologies are present in the literature in various facets, with different degrees of applicationand efficacy.

García et al. (2021) study among Colombian language teachers found that radio and music applications are teachers' favourite didactic tools. Significant frequency of use was also found for online dictionaries and translators. Instant messaging and video applications and social networks despite promoting authenticity, contentcreation and meaningful learning were found the least employed by teachers. This low usage was explained by a lack of training on the teachers'part and lack of appropriate infrastructure and technical support. (García et al., 2021, p. 83)

Applications used for online dictionaries can allow learners to improve their pronunciation and expand their vocabulary (Chartrand, 2016 as quoted in Nariyati et al., 2020, p. 39). Functions like these are already present in most online dictionaries and translators, including *Google Translate*, *DeepL*, *WordReference,* the Cambridge, Oxford and Collins dictionaries, and applications like *Forvo,*which act as repository of various pronunciations, including varieties and dialects.

Social networks have proved to be particularly effective in allowing communication between language learners. As reported in a literature review by Gonulal (2019), social networks like *Facebook* and *Twitter* have proven beneficial for finding and interacting with other language learnersand using vocabulary and grammar in conversation and chat writing. The study,

targeting Instagram users which were also English language learners, also focused on meaningful linguistic interactions using the social media application Instagramand its potential both in providing opportunities to practice language and creating a sense of community among language learners. The results of the study concluded that Instagram could be used for improving English communication skills and learning new English words, but also as a tool to motivate learners to communicate more using English. It is important to note that Instagram was alsoconsidered as not the only or main source for learning English, but as a peripheral language learning tool. In addition, the study noted how a learner's relationship with technology influenced the efficacy of learning and development of motivation. Another issue highlighted by the study is the prevalence of informal and colloquial language to which learners are exposed whilst usingsocial networks, which was felt by subjects of the study as a hinderance on improving grammar knowledge and overcoming structure-related mistakes.
Other common learning tools are Massive Open Online Courses (MOOCs) and Modular Object-Oriented Dynamic Learning Environments (MOODLEs), platforms intended for sharing learning materials, especially video courses. MOODLEs are platforms in which teachers can provide learning content and materials by customizing accessibility to learning. They can also be used for single lessons and tests in a blended and learner-centered perspective. MOOCs, meanwhile, prefer a distant learning dimension, where students are separated from each other and also from the teacher. MOOCs act as communication systems, with the Internet mediating interaction between the teacher and the learners. MOOCs are usually fee-free, while MOODLEs are usually reserved for people already enrolled in courses. (Moron, 2019, pp. 12-13).
Nowadays, MALL is synonymous with apps, especially mobile ones. Apps like *Duolingo* or *Babbel* are also considered as "dedicated language learning apps" and are divided into two categories: dedicated apps and generic apps (Reinders, Pegrum, 2016 as quoted in Almousawi, 2021, p. 167). The former includes apps such as *Busuu*, which can be used as standalone apps which the user can use without the guidance of the teacher. The latter includes apps like *Twitter*, that are not designed for language learning, but can be used for language learning if put in context and if their pedagogical use is considered by the teacher (Almousawi, 2021, p. 168).

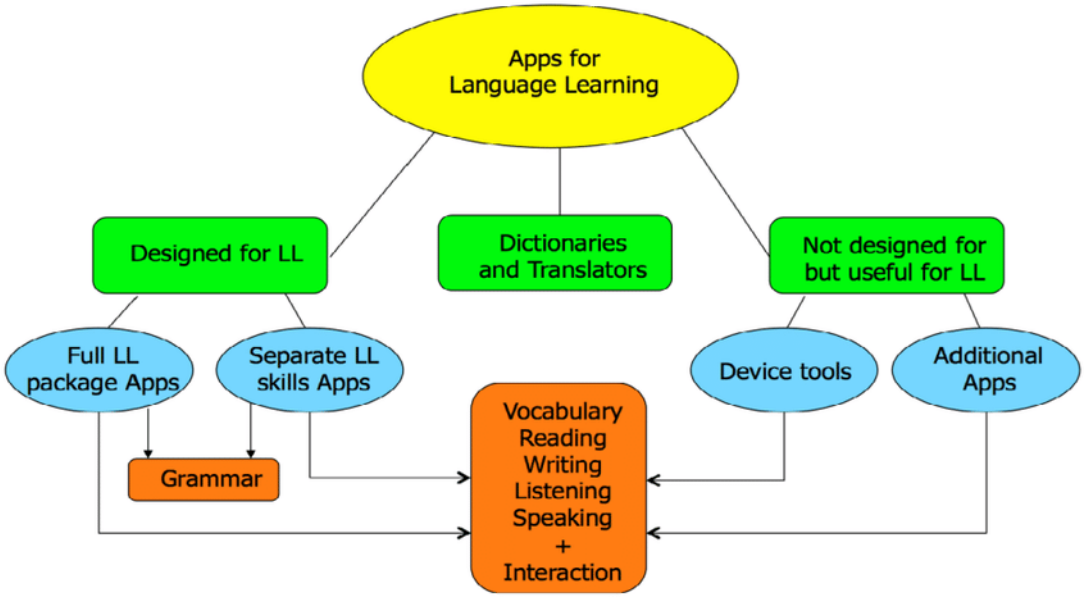

Figure 9: Apps for language learning taxonomy

As can be seen in Figure 9, language learning applications can be designed or not for language learning and focus on different skills with each activity or tools implemented. A third category includes online dictionaries and translators.

MALL usage in virtual exchange or eTandem projects has also been investigated, with interesting positive outcomes: eTandem projects provide learners with a structure of online collaboration, critical reflection, and a sense of actively contributing to a global and intercultural society (O'Dowd, 2019, as quoted in Griggio and Pittarello, 2021, p. 82). This form of peer-to -peer learning includes two communication modes, one in which languages such as French and English are used as *lingua franca*, and one in which time must be equally split between Italian and other languages. The platforms used include *WhatsApp, Instagram, Zoom, Skype*, and *Facebook*. Students are encouraged to upload diary entries on *Moodle* and tutors and teachers can propose topics for conversations, ranging from "safe topics" to more culturally challenging and personal topics. The means provided,especially those used from phones, have been considered by learners as dynamic, convenient, and that allow easy real-time interactions. Creating a safe environment through informality, spontaneity, and an inclusive multilingual environment can prepare the learners mentallyand emotionally to study abroad, while encouraging others to take part in similar activities, a strategicstep towards international mobility.

Finally, a mention goes to platforms like *Edmodo* and *Kahoot*, which are specifically designed for educational purposes and can be used for online tests, despite not being language

learning apps (Purwaningrum, Nur Yusuf, 2019, p.323).
The examples provided here are only a brief overview of what can be done with language learning applications, and this thesis will delve into them in more detail in chapter 2.

1.3 Advantages of Mobile Assisted Language Learning

MALL has many advantages that facilitate language learning: it enables students to create their own learning framework in terms of time, place, and how they will use online information and learning material, with the consequence that their education is independent, self-directed, and autonomous. The use of mobile devices in language learning and teaching has also been found to enhance the motivation for learning, as it facilitates alternative, non-traditional teaching methods. These are some of the advantages of employing MALL purported by the literature on the topic (Arvanitis, Krystalli 2021, p. 15):

- Enhancing the motivation for learning through the use of technology familiar to the learners, such as smartphones and computers.
- Giving more opportunities to students to develop communication skills.
- Encouraging the use of the target language as a unique means of communication.
- Facilitating the teaching process through exploring, analyzing, discovering, and choosing activities that make sense in the real world.
- Enhancing various types of interactions between real and virtual environments, students in the same classroom or students in other classrooms inside or outside the school.
- Promoting learning in a pleasant way.

MALL usage is often associated with the concept of ubiquitous learning: having access to learning technologies in whatever location the learner might be in, including a mixture of mobile and non- mobile technologies (Stockwell, 2022, p. 14).
It has also been linked with improvement in literacy, creativity, communication and increased student activity and interaction (Van der Poorten-Sawyer, 2020, p. 193).
A commonly employed formula for using MALL is BYOD (short for Bring Your Own Device). All that is required is a high-speed internet connection, reducing the costs for device purchases and their maintenance. Students might also be more attentive towards how they handle the technology used, as it is their property (Arvanitis, Krystalli, 2021, p.15).

MALL usage, especially integration of self-paced and teacher-based mobile activities, has been linked to increased motivation by the learners and lower cognitive loads, allowing students to reflect on areas where they had difficulties (Ozer; Kılıç, 2018, pp. 2923-2924). In a classroom setting, the usage of MALL can also allow students to move, interact, and participate actively without the fixedness provided by computers, aiding both teaching and learning. There is also the possibility to spend less time copying notes and more time interacting with the target language, as learners can take photos of the notes written by the teacher (Azli et al., 2018, p. 87).

MALL usage can also work alongside traditional teaching methodologies, complementing them and allowing students to take part in learning activities despite of the time and place, as is already commonplace with Zoom lessons for students who are ill or can't follow lessons for other reasons (Azli et al., 2018, p. 96).

The use of mobile phones for learning in particular has been considered useful for informal language learning, gaining new contextual and cultural knowledge, learning and recalling vocabulary, facilitating listening skills, and promoting student-centered and collaborative learning (Shadiev et al., 2017, p.291). The combination of abilities such as speaking and reading can be of great support to spoken language and language learners in general, as written and spoken material helps in the identification of unfamiliar sounds, words, and grammatical structures (Roberts, Kreuz, 2016, p. 36).

An aspect worth noting that has been reported to have positive impacts on motivation and learning is gamification elements. Gamification has been defined as (Shortt et al., 2021, p.3):

> "[…] Using game-based mechanics, aesthetics, and game thinking to engage people, motivate action, promote learning, and solve problems."

Gamification is characterized by five elements: goal orientation or setting an objective, achievement or the experience of success, reinforcing certain behaviors in response to outcomes, competition to encourage performance motivation, and fun orientation to ease stress and increase engagement (Shortt et al., 2021, pp. 3-4).

Another advantage in MALL is the potential for Autonomous Learning, defined as the ability by learners to take charge of one's own learning in an independent way. This can be achieved if the earner is aware of their academic goals. Promoting Autonomous Learning requires knowledge about the interests and motivation of learners. Teachers can promote learners' autonomy by facilitating learners with tools and materials to promote academic growth (Gonzáles-Valencia et al., 2020, p. 265).

Another advantage of the use of MALL is that it can support reflection on the learning moments experienced, and on the learning progress as a whole. In recording examples of language related to a weekly topic, mobile devices can facilitate the recording of noticing during the learners' daily routine (Ilic, 2021, pp. 103-104). Using a smartphone allows learners to take advantage of the timeframes between short and frequent visits to apps or sites to think or reflect on a given topic, and also to read and think about comments made by other users.

The asynchronous nature of MALL usage provided less pressure for an immediate response, giving learners time to be aware of their tacit knowledge (Ilic, 2021, pp. 107-109). Having a continuous link with other students through mailing lists and chats can also support the development of understanding, encourage discussion and increase opportunities for reflection-in-action (e.g., checking other students' answers or searching for examples), and reflection-on-action (increasing understanding through collaborating with a group). There might be the need to create a learning environment in which to make the learners express doubts, uncertainties, learning about contradictions and the ability to critique others and not just themselves. Finally, smartphones can act as constant reminders of the homework given to the learners; a constant, physical reminder of their responsibility as language students following Norman's three psychological levels of processing an object: appearance, usability, and capacity to elicit memories (Ilic, 2021, pp. 111-116).

1.4 Disadvantages of Mobile Assisted Language Learning

The problems posed by the introduction of MALL in a learning environment are considered by the literature not only on a didactic level, but a sociological and cultural level as well. Stockwell divides the controversies surrounding the use of technologies for language learning in four aspects (Stockwell, 2022, pp. 1-5):

- Pedagogical aspects: how teachers approach technology in the field of education, with some seeing technology as a way of updating teaching and making it more approachable and versatile, and others seeing it as a crutch, a gimmick with no educational value.
- Socioeconomic aspects: disparities in access to the elements required to use MALL effectively. Some of these aspects include having an updated device that can use MALL technologies, the presence of a stable Internet connection and the setting up of infrastructure in less affluent world regions, and the social pressure that might come from requiring learners from less advantaged situations to apply MALL, with problems including stress, embarrassment, feelings of inferiority and a negative impact on the learner's motivation.
- Academic aspects, i.e., validity of MALL in the literature: CALL and by association MALL, are academically considered as lesser fields to the parent fields of second-language acquisition and information technology, being branded in the literature as lacking in theoretical foundation and academic rigor. As Stockwell concedes, this was a sentiment present mainly in the early years of CALL research, as the field has seen advancements in the literature and a more solid and thorough research that established a theoretical basis for CALL and MALL. An example of this problem can be found in Burston (2021), who provided data for the under-reporting in MALL research due to diversity of research interests related to MALL, e.g., apps and software reviews, instructional technical design, teacher training, or student attitudes. Because of this widespread interest, MALL research has seen a limited number of official publications, even in journals specialized in CALL research such as CALICO, CALL, JALT CALL, LL&T, and ReCALL. Overall, MALL articles comprise between 4% and 13% of the articles in these prominent CALL journals, with the majority of MALL studies being published in a disparate nature (Burston 2021, published in Morgana and Kukulska-Hulme, 2021, pp.15-17).

- Learning environment management aspects: defined by Stockwell as the pressure on teachers and learners to use new technologies with little to no explanation or support/training provided by institutions and limited input in the selection of technologies to use. This category also includes the issue of costs for the learning environments, including training, maintenance of the technologies and hiring support staff. A quality aspect has also been put forward by many that doubt the quality, interactivity and efficacy of MALL compared to human interaction with a teacher, going back to the pedagogical aspects. An overreliance on technology might be a perceived advancement to the detriment of teachers and learners, being an obstacle instead of a facilitating tool.

Linked to the socioeconomic aspects are problems in MALL use of a technological nature, including but not limited to the device's battery life, lack of an internet connection, screen size, operating system or processor speed, the inability of using earphones and microphones, mobile application navigation and smartphone addiction. These problems can all hinder learning activities. (Ozer; Kılıç, 2018, p.2924).

On a psychosocial level, the impact of the learning environment itself needs to be considered, as various distractions may arise from environments such as public transportation or a crowded place. Thus, concepts such as mindfulness and attentional involvement need to be integrated when selecting a MALL learning environment for the students, or they might risk getting lost in the task or other distractions provided by the device, such as notifications. This is known as ''cyberslacking'' and can happen in any learning environment, especially so in class. When it comes to the concept of multitasking, learners can accomplish it, but it must be understood in the context of its efficiency costs, which can hinder a multitasking effort: switch costs (the time required to switch mindset to new goals required by a task), resumption lags (returning to the original task after engaging in a secondary one), and restart cost (reduced efficiency in the original task when looking back at where a learner left off). Learners are not multitasking because they make a conscious decision about how to divide their attention between different tasks and stimuli and which elements to sacrifice (Stockwell, 2022, pp. 118-124). It has also been argued that learners need guidance and assistance in order to use mobile learning tools effectively, and they might not use them at all even if encouraged: for most learners and users simply having a device or app is not indicative of use for learning purposes, especially if there

is a link between learning use and personal identity, e.g., using an app with social functionalities (Stockwell, 2013, pp. 4.5).

Linked to gamification, the concept of how learners approach given tasks is also problematic for MALL didactic potential, as students reportedly complete tasks by putting emphasis on scores and overall task completion. This is done to not have pressure during activities instead of metacognitively reasoning on the language provided. Such is the case with online multiple-choice tasks completed by simply clicking the answers in order, without reading the texts provided. The ultimate outcome for MALL learners might be finishing tasks which the teacher can consider complete without acknowledging how much linguistic effort has been put in completing them (Stockwell, 2022, pp. 125-127).

On a pedagogical level, some teachers consider mobile devices a mere distraction, especially if students use their devices in class for anything other than the activities proposed. In-app purchases, third party pop-up advertisements and limited access to contents are all factors considered distractions in MALL usage (Chik, 2014, as quoted in Van der Poorten-Sawyer, p. 41). Teachers are then expected to check the students' devices and behavior (Ozer, Kılıç, 2018, p. 2924). Another argument against MALL is that its usage would not help the students to practice their copying and writing skills (Azli et al., 2018, p. 87).

It has also been reported that MALL apps, for the most part, do not allow for users to have moments of pausing during the learning sessions to process and engage in critical self-reflection activities following the concept of metacognition.

Metacognition refers to the ability to be aware of one's own thoughts and actions, and by extent the ability to reflect upon one's learning, understanding it, and controlling it. Metacognition has been found to be important for understanding how different tasks should be performed, along with other skills related to comprehension and performance, writing, language acquisition, attention and memory (Kessler, 2021, p. 5). In the case of Duolingo usage, as investigated by Kessler, the most frequent act of metacognition found was recognizing progress, but a correlation was also found between the amount of time users spent on the app and the gains made by the learners. In a classroom context or with the limited time learners could dedicate to app usage, learners could feel that they are not making as much progress as they hoped and quickly lose motivation (Kessler, 2021, pp. 9-11).

Related to this is the lack of pragmatics in language learning apps, which mostly do not show the social use of language. Delaying the use of pragmatics such as cultural references and rhetorical speech devices until pronunciation, grammar and vocabulary are perfectly established can deprive learners of the richness, subtlety and even fun of the process of learning a new language. Introducing pragmatics into language starting from the base level can strengthen pronunciation, vocabulary and grammar. Furthermore, because pragmatics is culturally dependent, it allows students to understand the language more thoroughly and convey complex meanings effectively and engagingly (Roberts, Kreuz, 2016, p. 56).

According to users in experimentation contexts, course content in apps teaching vocabulary do so at the word level, rather than considering the language as a whole. The language proposed is thus seen as disjointed and inconsistent, with unchanging formats locking users into "boring" loops (Van der Poorten-Sawyer, 2020, p. 101).

Platforms such as Duolingo have been considered by users in many studies found in the literature as a viable learning tool, but in conjunction with more traditional learning methodologies, or as tools for review.

Another aspect lacking in most Dedicated Language Learning Apps is the presence of Scaffolding Tools, an activity which is usually dependent on the teacher's successful orientation of learners' communicative outcomes. Some Scaffolding Tools are present in a spare number of apps, mainly in the form of embedded dictionaries, examples of grammar rules and giving hints for answers (Almousawi, 2021, p. 171). The amount of vocabulary and other language content present in apps like Memrise without clear scaffolding means or division into sections can cause cognitive overload, with learners focusing on completing the activities without actually learning anything. Timed tests also impose a challenge that can lead to cognitive overload (Roberts, Kreuz, 2016, pp. 132-134).

And while extending the MALL label to include social media and other means of virtual communication provides literature with examples of interactive communication in authentic language, Dedicated Language Learning Apps do not facilitate collaborative learning and interaction, as most users communicate with the technology only or automated bots. This lack of communication is in contrast with the Maxims of the Cooperative Principle (Maxim of

Quantity, Quality, Relation and Manner, Roberts, Kreuz, 2016, pp. 56-57), resulting in an artificial learning environment (Roberts, Kreuz, 2016, pp. 56-59).While it is true that some apps allow for users to chat in forums inside the app, this function is not clearly shown to most users, with some even ignoring the existence of such means of communication (Almousawi, 2021, p. 172). This is linked to the concept of Self-Directed Learning (SDL), defined as (Tran, 2020, p. 24):

> "A process in which individuals take the initiative, with or without the help of others, to diagnose their learning needs, formulate learning goals, identify resources for learning, select and implement learning strategies, and evaluate learning outcomes. […] Both the external characteristics of an instructional process and the internal characteristics of the learner, where the individual assumes primary responsibility for a learning experience."

SLD includes three dimensions (Self-management, Self-monitoring, and Motivation), and two key issues were found in its inclusion of distance learning: the facilitator's guidance and the context of learning. SDL is highly dependent on learner-facilitator interaction and collaboration, so isolated learning provided by MALL can have negative impacts. Thus, the choice of SDL programs should follow criteria such as increased flexibility, geographical independence, enriched learning opportunities, suitability with the rapidly changing nature of knowledge and the temporal independence of anytime learning. Teachers should also consider raising awareness of the substantial rapport needed to facilitate students' SDL with technology (Tran, 2020, p.25).

MALL technologies are also subject to Gartner's hype cycles (Stockwell, 2022, pp.38-39), which can hinder their potential as valid didactic tools and limit teaching, as it focuses more on technology trends than employing actual technology with learning potentials. The cycle starts with a technology trigger, accompanied by a fallacy that expects this new technology to solve problems posed by past tools. Such expectations lead to disappointment, followed by a reduced use of the technology, abandonment or a "slope of enlightenment", and "plateau of productivity" in case of continued usage. An example of this could be the inclusion of gamification elements in apps like Duolingo: once the novelty effect disappears, despite initially high engagement and motivation, the gamification elements are not enough to compensate for the repetitiveness of the activities and the lack of feedback and active language production (Shortt et al., 2021, p.22).

Researching MALL technologies need to overcome the initial steps of approach with the provided tools and analyze them further, something that is rarely considered and done. This

happens even less, if the technology is imposed by an institution on teachers, that might be less tech-savvy, or unlikely to have used technology: they might lose motivation and hinder their teaching in the process (Stockwell, 2022, pp. 49-50). To help this, proper training needs to be provided to both teachers and learners.

The focus of language learning apps on language systems can be further explained by defining the concepts of focus on form and focus on forms. The former occurs in a communicative task where it arises from the teacher and/or the learners if there is a communicative breakdown. The latter refers to teaching pre-selected linguistic items, and the primary focus is on forms, not on meaning (Ellis, 2005, as quoted in Almousawi, 2021, p. 172). By presenting a simplified input which represents a behaviorism view that linguistics knowledge is the only knowledge learners need to take into a habit, apps that focus on language system are in fact focusing on forms. The vast majority of practices provided by Dedicated Language Learning Apps are mechanical practices such as translating sentences, multiple choice, true or false, or gap-filling, whereas meaningful and communicative practices are a minority in the whole spectrum of activities offered. The entirety of this approach is defined by Almousawi as Restricted CALL/MALL (2021, p. 174):

> "Restricted CALL/MALL features closed tasks, also known as drill-and-kill, which consists of repetitions, translation, multiple choice and gap filling. […] 90% of DLLAs represent restricted MALL (as of 2019)."

Apps are seen as a behaviorist tutor, but simply developing linguistic competence does not mean learning a language.

In the following chapters this thesis will keep into consideration the aspects considered in the literature and analyze how they are applied by users in real-life situations.

CHAPTER 2: Understanding MALL usage. An analysis of users' behaviors towards MALL and most common examples.

This chapter will focus on presenting the functions of the most used language learning apps available on technological devices and the major learning benefits found in literature along with a critical outlook of the problems these apps have.

2.1 Main characteristics of apps for language learning

How to evaluate what apps are the most useful for language learning can be a daunting task. With so many choices available to the users, determining a clear method and criteria for app selection is an important step. Prior to the advent of apps, evaluations of educational software posited usability and learning for university contexts as the main criteria for selection. Walker (2010) lists other valuable criteria, such as curriculum connection, authenticity, feedback, differentiation, user-friendliness, motivation and student performance. Prior experience with apps and the language app marketplace can also be a criteria allowing for easier discerning between valuable apps and those not worth considering. From a Second Language Acquisition (SLA) perspective, apps value can be reviewed according to three categories: Content Target, i.e., identifying potential users, Procedure and Approach, i.e., analyzing the apps from a pedagogical and SLA perspective, and Technological Features, i.e., noticing the technological function that the apps provide and the ease of use (Almousawi, 2021, p. 169). Another aspect is how the actual access to the content is facilitated, considering that many apps focus on macro-skills of language learning and communication (e.g., speaking, vocabulary, listening); in order to assess this, when evaluating the didactic potential of a learning app criteria such as the following need to be considered as well (Van der Poorten-Sawyer, 2020, pp. 76-78):

FEATURES	KEY QUESTIONS FOR CRITERIA SELECTION
User Friendliness	Is the app easy to use without complicated logins? Is it simple to use with an interface that is attractive and logical?
Range of Tools	Does the app offer a range of ways to learn?
Authoring	Can users manipulate content to create personalization?
Authenticity	Is the language provided useful? Does it extend learning with examples of language in use?
Differentiation	Are there items suitable for all levels of proficiency?
Gamification Elements	Are the gamification elements useful for learning or are they simple and superficial add-ons that do not impact on learning?
Progressive Curriculum	Is there an organizing principle or a methodological strategy with content presentation?
Language Focus	Does the app cater to a range of language skills?
Sharing	Can content be downloaded and shared? Does the app enable users to form communities?
Costs	What are the charges? What type of ongoing payments are there?

Table 4: Criteria for selection of language learning applications

What follows is a selection of different applications following some of the criteria included in Table 4. It has been decided to mention the most relevant ones that are usually mentioned in literature and are the most commonly known by the general public, as will be described in the third chapter detailing the experimentation. Each application will be given a general description of its features, and some of the advantages and disadvantages it provides.

2.1.1 Duolingo

Duolingo is a language-learning platform launched in 2012 that offers courses in 39 languages as of September 2022. The application is available on mobile devices as well as online. The platform is structured as a series of individualized instructions and offers tests to assess a learner's proficiency level, materials for business and schools. Each learning experience is divided into themed units, ranging from the basic content of a language (usually greetings) to sections such as "food" or "travel" and some grammar content depending on the language chosen. Users have access to a list of content they have learned, as well as other activities to track frequency or practice reading and listening comprehension. Finally, users also have the possibility of discussing language related topics with other learners on dedicated forums (Teske, 2017, pp. 393-395). Activities focus primarily on translation skills, pronunciation, vocabulary, listening comprehension, and spelling. Each lesson is comprised of ten to twenty questions, with drill activities being composed of multiple-choice questions, matching, translating sentences or constructing a sentence by inputting words in the correct order. Some activities also include speech recognition to evaluate oral production. The platform has adopted "gamification" elements, as completing every lesson in a unit at least once is mandatory in order to progress, and each session has a limited number of lives, with lives subtracted for each mistake the user makes. As an additional reward for completing levels and activities, a form of currency for the platform called "lingots" can be used for redeeming various gadgets, which mostly have a very limited impact on the learning experience (Teske, 2017, pp. 393-395). The gamification elements related to *Duolingo* include progress indicators (daily goal and experience points, the experience of unlocking levels), feedback given to the user, a fixed reward schedule (experience points), time-dependent rewards, customization (buying outfits for the owl mascot), challenges, knowledge sharing, leaderboards, badges and achievements, and virtual economy (Shortt et al., 2021, pp. 5-6). Among the gamification elements positively perceived by the literature, badges, streaks and leaderboards have been mentioned for their ability to create a community-oriented learning environment. Other aspects that have been positively mentioned include "lingots" as a form of participants' engagement and the feedback on activities and mistakes.

Among the advantages offered by the platform found in the literature, we can find references to the app's flexibility and the aforementioned gamifying elements, influencing learners' motivation and the possibility of learning beyond the confines of the classroom (Shortt et al., 2021, pp.3-4).

There is, however, a lack of activities that focus on pragmatic and cultural skills, as the focus is mainly on production of structurally accurate output, along with a lack of grammar-based activities. This repetitive nature is in line with the Audiolingual Method, with negative outputs being repeated to the user until a satisfactory language standard is reached. Users are able to memorize and repeat content in the target language but lack the ability to creatively produce language in authentic and significant contexts (Koike, Klee, 2013, as quoted in Teske, 2017, pp. 398-399). It is worth noticing that *Duolingo* makes no claims of being a communicative-based learning tool, but a less fixatedly structured curriculum could make a better positive impact on user motivation by structuring the lessons according to user needs. As it is, the language activities that form the language curriculum leave the learners with little control over the content of their language course (Teske, 2017, pp. 399-400). Other limits found in the literature regarding usage of the platform relate to the focus on memorization and reproduction of aspects of spelling, the lack of grammar-based content and lack of interactivity with other users (Kessler, 2021, pp.14-17).

The gamification features and increased engagement have been considered as incapable of compensating for the concerns brought towards *Duolingo*: distractions reported by the users with using a mobile device for learning, activities perceived as repetitive and over-reliant on translation and receptive skills, the usefulness of feedback limited to grammar, a lack of detailed explanations and activities to produce linguistic content and a lack of opportunities to enact meaningful social engagement (Shortt et al., 2021, p. 21).

There are studies conducted providing results of improvements in language learning, such as English vocabulary mastery and listening, speaking, writing, lexical and grammatical knowledge of Turkish. In contrast with these results, other studies found no significant differences in linguistic achievements and self-efficacy, and the accuracy of studies results is debatable, with limited sample sizes and many variables such as motivation, language background, the use of other class activities and demographics such as gender and ethnicity, which were not considered when analyzing changes in participants language performance (Shortt et al., 2021, p. 20).

2.1.2 Busuu

Busuu is a language application which provides course in 14 different languages, and its lessons are classified according to the Common European Framework of Reference. Language courses by *Busuu* train the four main skills needed (oral production and comprehension, written production and comprehension), provide language in use and whole language phrases along with vocabulary learnt in dialogues and arranged thematically, and also give users the possibility to share material and practice with native speakers. Studies on *Busuu* usage highlighted that, while the application is enjoyable and can improve motivation and interest in language learning, most users wouldn't pay for a premium membership and use the added tools this could provide, while also declaring that some activities were repetitive and predicable (Al Dhakil, Al Fadda, 2021, p.3). Overall, *Busuu* is one of the applications most positively considered in the literature: it is an easy and useful learning tool to increase overall language knowledge and help users who have trouble understanding topics done in class or who are shy and afraid to communicate with other learners (Al Dhakil, Al Fadda, 2021, pp. 9-11; 2020, p. 81).

2.1.3 Memrise

Memrise is a learning platform that utilizes flashcards as memory aids and uses creative ways to recall vocabulary (Fathi et al. 2019, p. 29). Vocabulary lends itself easily to adaptive learning, and *Memrise* offers a spaced-repetition system (SRS), which can help develop in a more desirable condition. Adaptive learning has been defined as (Kerr, 2015, as quoted in Fathi et al., 2019, p. 32):

> "A way of delivering learning materials online, in which the learner's interaction with previous content determines (at least in part) the nature of materials delivered subsequently."

Memrise is conceived as a "freemium" app, that is, with a free download and in-app purchases, including the premium features of the app. Like Duolingo, *Memrise* also presents gamification elements, in the form of points that reward users' learning. The decontextualized setting the flashcards are presented in might be confusing for learners, as there is a near endless supply of material provided. Memorizing this decontextualized vocabulary is a practice rooted in behaviorism, which theorizes that learning can take place through habit formation without needing any contextual support. *Memrise* has been found to have to potential to improve different language skills, as learners can self-regulate their own pace of learning vocabulary through making use of *Memrise* (Fathi et al., 2019, pp. 34-39), enabling rote memorization.

Another benefit of *Memrise* usage is the possibility for teachers to create their own material to use in class.

Virtual platforms like *Memrise* are normally seen as tools that facilitate the learning process, though some students may find these platforms as extra work and lose interest (Fathi et al., 2019, p. 282).

2.1.4 Babbel

Babbel is a language learning company which currently teaches 14 languages to 10 million subscribed users worldwide. The application uses the method of "language pairs", with a strong focus on practical conversation skills and supplementary interactive content (such as magazine articles, games, podcasts and videos). In 2019 *Babbel* published a course called "*Babbel* Intensive" designed for enterprises, which includes access to all of the platform's lessons and 48 lessons per year with a personal language tutor. The program is available for five languages, including English, Spanish and German, and has been praised for the ability to offer its learners the flexibility to learn at their own pace and receive personalized feedback on their speaking skills from a certified professional (Mendes de Oliveira et al., 2021, pp. 9-10). The main difficulties found by *Babbel* users were staying motivated, finding time to practice, setting up a learning schedule, and finding the right teacher (mainly due to time zones, criteria with which to select the teacher). Along with this, the app has mostly premium features that require payment. Among the points in favor of using *Babbel*, users have noted that the app is useful for practicing interactions, although some users commented that they are obligated to improve language skills. These comments mainly come from employees who need language learning in order to keep their working position or appease higher-ups, leading to a mixture between intrinsic and extrinsic motivation. On the whole, the one-to-one format of the lessons tends to present a perception of personalization of goals and a sense of progress in the language (Mendes de Oliveira et al., 2021, pp. 16-19).

2.2 Motivation in adult language learners

A characteristic of most non-formal and informal learning environments that is also applicable to formal learning is autonomy, and the concept of working autonomously has been important in understanding and promoting learner motivation. Since Holec's definition of the ability to take charge of one's own learning, the concept of autonomy has evolved to include proactive and reactive dimensions, or a framework of out-of-class autonomous language learning with technology as a concept that changes discreetly according to where it is situated (Van der Poorten-Sawyer, 2020, p. 31). As individuals moving towards a conception of learning that is detached from the teacher's strictly selected material, young adults start to integrate in their learning many of the principles relevant to adult learning, which include (Knowles, 1984, as quoted in Van der Poorten-Sawyer, 2020, p. 32):

1. **Need to know**: Adults need to know the reason for something.
2. **Foundation**: Experience - including mistakes - provides the basis for learning activities
3. **Self-Concept**: Adults need to be responsible for their decisions on education; they need to be involved in the planning and evaluation of their instruction
4. **Readiness**: Adults are most interested in learning subjects having immediate relevance to their work and/or personal lives
5. **Orientation**: Adult learning is problem-centered rather that content-oriented, focusing for instance on activities based on solving real-life problems or tasks rather than analysis of content only
6. **Motivation**: Adults respond better to internal motivators, e.g., passion or desire to improve, rather than the external ones, e.g., monetary motivations or dictated by external factors or actors

Other principles include the need to account for adults' full range of emotions and intrinsic drives, and their many life experiences (Van der Poorten-Sawyer, 2020, p. 33).

Among the factors that might be considered for adult language learning we can find desire to improve language ability for work or study, personal desire, the will to enter into contact with another culture, the discovery of self-identity, or just new hobbies. The aspects that might lead to demotivation, meanwhile, can be derived from life changes, learning alone because of lack of opportunities to speak to native speakers, lack of technical ability and training in the apps

chosen or language learning in general, not making clear goals, difficulties in finding material that suits one's needs and interests, engaging in activities without receiving external feedbacks, or negative experiences with the apps, including inability to pay for specific language learning tools (Van der Poorten-Sawyer, 2020, pp. 169-184).

Another feature of adult language learning is meta-learning, which is employed more easily by adult learners: elements such as metacognition (thinking about thinking, metamemory), metalinguistic awareness (knowing about how language works and knowing how to use a language to do things such as how to be polite or how to make a joke), are more precise and sophisticated during adulthood (Roberts, Kreuz, 2016, pp. 9-10).

After observing opinions on specific applications found in literature, the following chapter will discuss the opinions and experiences of an experimentation sample with language learning applications.

CHAPTER 3: The Experimentation

This chapter will focus on an experimentation period during which a sample of young adult learners used language learning applications.

3.1 Context and research questions

The study had the objective of understanding learner opinion and behavior towards language learning applications, observing motivation and usefulness of MALL approaches. The experimentation period also had the objective of analyzing how subjects responded to an extended period of language learning apps use and if the apps had any didactic potential and advantages compared to traditional language teaching. The data for this experimentation was collected through surveys, and allowed to answer the following research questions:

RQ1: What are subjects' opinions and knowledge of MALL technologies?
RQ2: What are the advantages and disadvantages of a MALL approach?
RQ3: What is the didactic potential of MALL?

The experimentation was developed following these steps for the surveying (Nunan, 1992, p.141):

- Step 1: Define objectives (What do we want to find out?)
- Step 2: Identify target population (Who do we want to know about?)
- Step 3: Determine sample (How many subjects should we survey, and how will we identify these?)
- Step 4: Identify survey instruments (How will the data be collected: questionnaire/interview?)
- Step 5: Design survey procedures (How will the data collection actually be carried out?)
- Step 6: Identify analytical procedures (How will the data be assembled and analyzed?)
- Step 7: Determine reporting procedure (How will results be written up and presented?)

3.2 Data collection tools and procedures

The sample was recruited through *Whatsapp* and *Instagram* on a voluntary basis by explaining to them the focus of the experimentation phase and the procedures that would have been followed. The study included the following phases:

- Introductory questionnaire asking for opinions and previous experiences on MALL and dedicated language learning applications.
- An experimentation period of three weeks during which participants were asked to select a language learning application and use it daily to learn a language of their choice. The participants were also asked to complete a feedback questionnaire every three days, for a total of six monitoring questionnaires.
- A final questionnaire collecting opinions on the experimentation and concluding opinions on language learning applications.

3.2.1 Introductory questionnaire

First, the subjects were given an introductory questionnaire to complete (see Annex 1). The questionnaire was divided into 6 different sections. The first one was aimed at collecting data about the participants, their current occupation, and their experience of MALL use.

The second section intended to investigate the participants' knowledge of foreign languages, asking if foreign languages were used in their work or study environment, the level of competence perceived by users according to CEFR (Common European Framework of Reference) rankings, and if subjects had ever used language learning apps. For those who answered negatively, the question marked the end of the questionnaire. Otherwise, the participants would not have been able to answer the rest of the questionnaire.

The subjects that answered positively accessed the third section of the questionnaire, comprised of general questions regarding language learning apps use: what apps they used among a list of 12 commonly used language learning apps, why the apps were chosen by the users, and what languages they attempted to learn. The subjects were also asked to think about how much time they spent on the applications, and whether they accessed the apps on a daily basis or not. Finally, the subjects were asked if they liked using the applications or not.

Those that answered positively accessed the fourth section of the questionnaire, where subjects were asked why they liked the apps used and if they found them motivating and engaging. The subjects that answered negatively were directed to the fifth section of the questionnaire, where

they were asked to report why they did not like the apps used, why they didn't find them motivating or engaging for language learning, and what they would have modified about them.

3.2.2 Monitoring questionnaire

After selection of the sample and an introductory questionnaire, each subject was asked to choose a language learning app out of a list provided in the questionnaire. The apps selected were the following:

- *Duolingo*
- *Babbel*
- *Memrise*
- *Busuu*
- *Cake*
- *Drop*
- *Tandem*
- *Rosetta Stone*
- *Mondly*
- *Speakly*
- *Cake*
- *Beelinguapp*

The applications were selected according to their availability on the market, how known they are by the general public, the possibility to use them on smartphone and other devices, the content freely provided to the learners without in-app purchases and online reviews on the topic of valid language learning apps.

After selecting an app for the experimentation, the subjects were asked to use it as much as possible, preferably on a daily basis, according to their needs and availability. Their progress was reported every three days in a questionnaire sent via *WhatsApp* during a period of three weeks, for a total of six questionnaires collected. The questionnaires are comprised of a mix of close and open items, with multiple choice and writing of short and long answers depending on the question. The items and the phrasing of the question were designed with a generalist target audience, one which might not be specifically familiar with the academic concepts behind MALL study and language teaching in general (Nunan, 1992, p. 197).

The questionnaire asked subjects about the app they chose, specifically what app, how long they had been using it, and if it was still the same app they used from the previous questionnaire. Then the survey asked participants about the overall learning experience, asking questions about the device they used, use of additional material and technological tools, and how much time they spent on the app. Finally, the subjects were asked about their personal opinion, stating what they liked and disliked about the application chosen, what skill they were focusing on, and if they changed app. In case of switching to another app, the subjects were also asked to tell why they did so. The subjects were also asked if there were any topics or skills missing from their app they would have liked to work on.

3.2.3 Final Questionnaire

In order to collect any final thoughts and opinions from the participants about the experimentation period, the subjects were given one final questionnaire to answer. The questionnaire could be filled in up to 22 days after the beginning of the experimentation, asking questions about the overall experience of the subjects with foreign languages outside of their use of language learning apps.

The questionnaire asked subjects two clusters of questions: the first was about the participants' experience with foreign languages, asking what languages the participants knew before the experimentation period, what languages they studied during the experimentation period and why they chose them, and if the subjects focused on a language they had already studied or a previously unknown one. Finally, this cluster asked participants if they believed to have learned something more regarding the language they chose and what skills or aspects they focused on.

The second cluster was comprised of questions regarding subjects' final considerations about language learning applications. First, the subjects were asked if their opinion on language learning apps had changed after the experimentation period and how. Then, the participants were asked if they used the same application throughout the three weeks the experimentation lasted. Finally, the participants were asked if they would have recommended the apps used during the experimentation to other learners.

3.3 Analysis of Questionnaire Data

The analysis of the data collected through the questionnaires was developed in different phases. First, numerical data, such as those reported in percentages, was reported in charts, specifically lists and histograms or pie charts. Open questions were analyzed by grouping similar answers in clusters or analyzing each comment for answering the questions and making a list, reporting the most relevant or interesting comments.

For the introductory questionnaire, the results from questions 4 through 7 were used for answering RQ1, meanwhile the answers from questions 8 through 10B were used for answering RQ2. Finally, the results for question 11 were used for answering RQ3.

As far as the monitoring questionnaires are concerned, the results from questions 1 through 4 were used to answer RQ1, while the results of questions 5 through 10 were used to answer RQ2.

The final questionnaire, that concluded the experimentation period, was analyzed like the other questionnaires. Answers from questions 3 through 6 and question 8 were used to answer RQ1 and RQ3.

3.4 Results

The results will be analyzed section by section, starting with the results of the introductory questionnaire, moving to the results of the experimentation questionnaires (analyzed as detailed in section 3.3), and finally the results of the conclusion of experimentation questionnaire.

3.4.1 Introductory questionnaire

Section 1: Participants

The participants involved in the questionnaire are 20 young adults between 20 and 30 years of age, with 45% of the subjects being between the ages of 25 and 27. 35% of the subjects is studying, another 35% works, 20% of them both studies and works, 10% are currently looking for an occupation. The students are enrolled at different university courses.

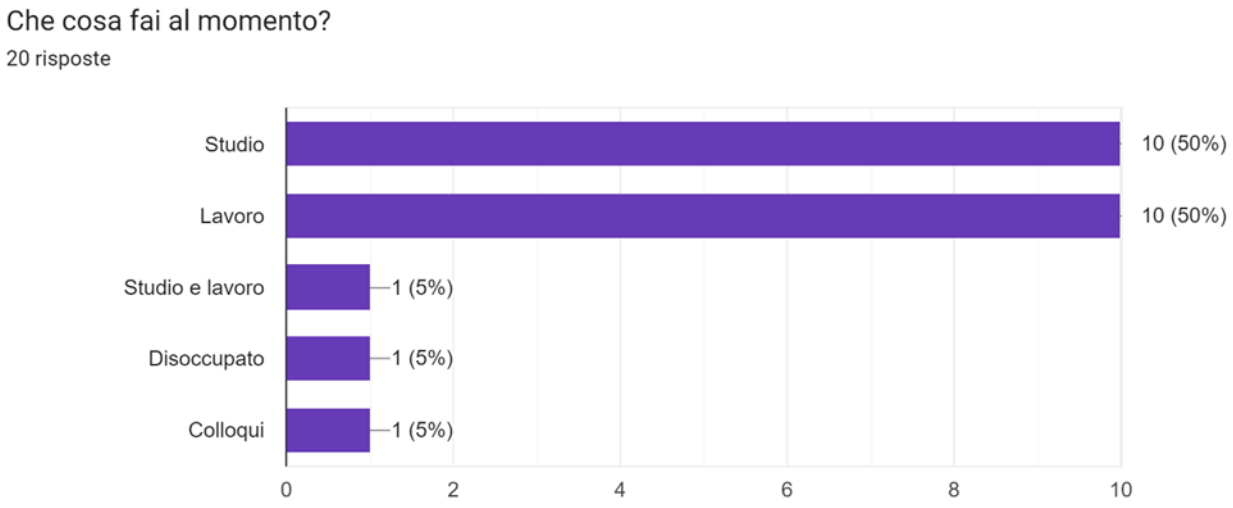

Chart 1: asking participants what their current occupation is

The only criteria for selection were their age. The selection was done starting from clusters and on a convenience basis, with selection and acceptance of individuals until a satisfactory sample number was reached. Since this is a preliminary study, attempting to understand a selection of users' feelings and experiences towards language learning apps, the results of this study are not intended to be generalized for the entire population (Nunan, 1992, pp. 141-142).

Section 2: Foreign language use

When asked if they used foreign languages in their study or work environment in a scale of 1 through 5 (1 = always, 5 = never), 8 subjects (40%) said that they always use foreign languages, 2 (15%) said that they use them often, 5 (25%) sometimes use them, 3 (15%) rarely use foreign languages, and only 1 subject (5%) never uses foreign languages in their study or work environment. When considering how subjects perceived their language level according to CFER thresholds, the most common levels indicated by subjects were B1 (4, 20%), B2 (5, 25%), and C1 (6, 30%).

Finally, when asked if they had ever used mobile language learning apps, most participants (15, 75%) answered affirmatively, while 5 (25%) answered negatively.

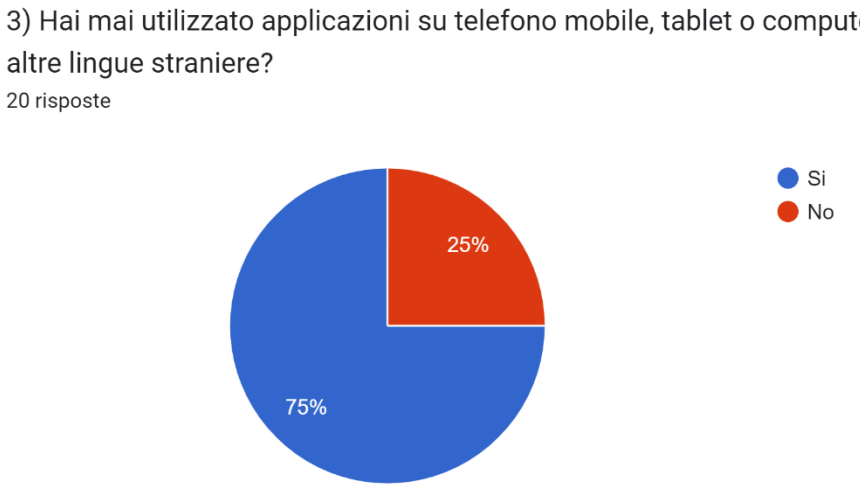

Chart 2: Have you ever used applications on smartphone, tablet, or computer to learn English or other foreign languages?

From this point onwards, the questionnaire will consider the answers of the remaining 15 subjects.

Section 3: Language learning Apps Use

The language learning app most used by users who had previous experiences with MALL was *Duolingo* (14 participants, 93.3%), followed by *Babbel* (3 subjects, 20%), *Memrise*, *Rosetta Stone* and *Tandem* (2 subjects each, 13.3%), *Busuu* and *Drop* (1 subject each, 6.7%).

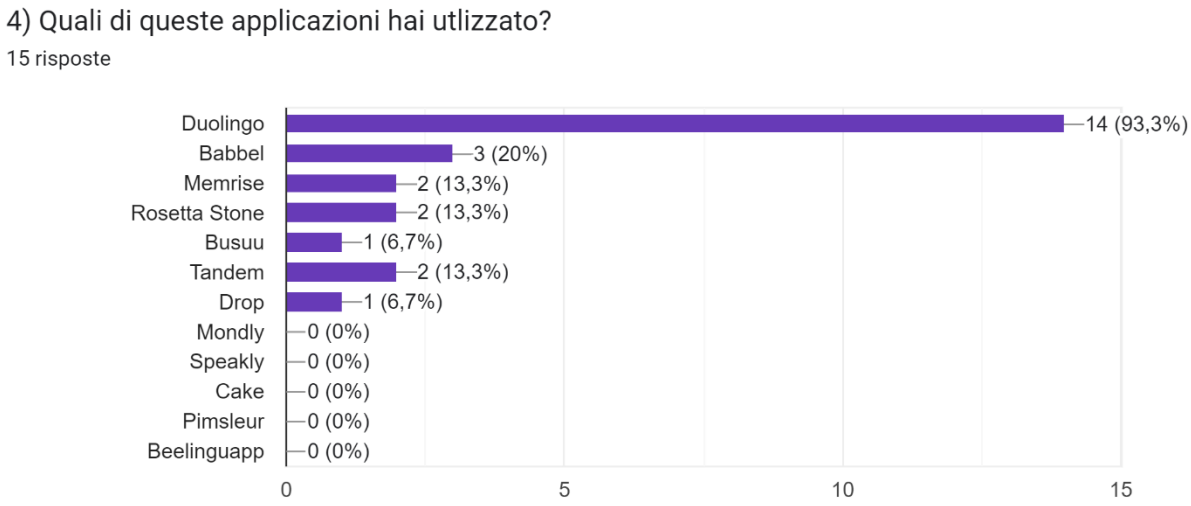

Chart 3: Which of these applications have you used?

When asked why they chose to integrate MALL in their language learning habits, subjects gave the following reasons:

- Subjects wanted to learn a foreign language or better study an already known language for personal reasons (12 subjects, 80%)
- Subjects were curious towards language learning apps (6 subjects, 40%)
- Subjects wanted to learn or better study a foreign language for work or study (2 users, 13.3%)
- Subjects were recommended language learning apps by other individuals (2 subjects, 13.3%)
- Subjects used language learning apps as a way to pass leisure time (1 subject, 6.7%)

Subjects used language learning apps to learn various languages, with the most commonly referenced being Spanish (4 subjects), Portuguese, German and French (3 subjects each). Other languages participants tried to learn through apps included Japanese, Korean, Polish, and Norwegian.

When asked if they set time limits for each learning sessions, most subjects replied that they did not set them (5 participants, 33.3%). Those subjects that did set time limits varied in their responses, ranging from a minimum of 3 minutes to 15 minutes, sometimes longer. Another question with varied responses was one in which subjects were asked if they used language learning apps on a daily basis, with some using apps every day (4 subjects, 26.8%). Of particular interest for the objects of this thesis are a number of subjects (8 in total), who reported high level of usage, almost daily, in the first week or weeks of app use, only to decrease usage as time went on. The reasons why this happened are the subject of the following section of the questionnaire: when asked if subjects liked using language learning apps, most answered positively (13, 86.7%), but some answered negatively (2, 13.3%).

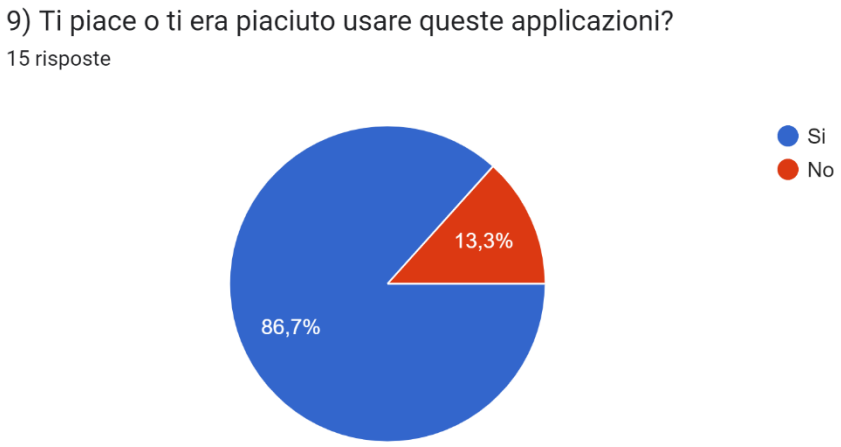

Chart 4: Asking participants if they enjoyed using language learning applications.

Section 4: Positive aspects of language learning apps

Participants indicated various positive aspects of language learning apps. Among them, answers include:

- The possibility to hear the correct pronunciation of words.
- The possibility to learn based on topics selected by the app.
- Gamification elements present in applications.
- Quick and easy access and use
- The possibility to do revision of notions after some time has passed and see mistakes and/or improvements.
- The possibility of learning new vocabulary in a fixed setting
- Short timespans and using pictures to learn new words.

As it can be noted from the comments made by participants, the main elements that denote MALL are related to aspects that differentiate it from traditional language learning, such as gamification and shorter timespans. There is the desire by the learners to engage in a more informal way of learning, in line with their daily needs and somewhat detached from their experience as students.

When asked if language learning apps can be effective for increasing motivation in language learning, the result has been mostly positive (7 participants, 53.9%), with some negative answers (3 subjects, 23.1%). Among the negative comments, two are of interest:

> Not that much, [the apps] were all the same, and I got a bit bored (S.1).
>
> They are [useful] for practicing a known language, but they do not seem as effective for learning a new language from scratch (S.2).

Section 5: Negative Aspects of Language Learning Apps

The participants that had a negative experience with language learning apps indicated a few elements:

- The sentences used in the activities were too simple.
- The vocabulary given was too basic and presented only a fraction of a given language.
- Apps only allow to practice vocabulary and pronunciation; aspects such as syntax, pragmatics, culture, and grammar are entirely overlooked.

As was discussed in the first chapter this approximation in language learning apps is a recurring topic, with a rather superficial presentation and problems that are shown when a user actually attempts to delve deeper into language learning. When asked why participants did not find language learning apps motivating or engaging, one comment brought an interesting argument:

> They give off the impression of being developed for tourists, with tourist topics and vocabulary, which quickly bores every other user (S.3).

When asked what aspects of language learning apps participants would change, they gave some answers related to their needs and what they want out of language learning:

- More accurate translations
- Less repetition in sentences or examples given.
- More complex activities
- The possibility of practicing writing
- Practicing grammar more, with flashcards or files that summarize grammar notions.
- Interacting more with the target culture through reading, listening to dialogues, and reading from active language sources such as newspapers.

The desire of a language learning app that included a pragmatic approach, including culture, has been noted in another comment:

> I would choose a single resource (e.g., website or app) that includes all that can be learned about a language or culture, along with different targets and levels one would like to reach. There are websites and apps that can delve into these aspects but researching them one by one can be complex. By creating a single resource guiding users can be easier even for those who do not have the most recent technological means (for instance, having more than one app on a smartphone is not a given if that smartphone is an older model and does not have enough memory capacity) (S.4).

After commenting user experiences and what MALL tools they employed the most, including their opinions, it should be worth noting what apps are more employed by users and the functions they might offer.

3.4.2 Monitoring Questionnaires

First week

The questionnaires delivered in the first week analyzed the first three and six days of experimentation. The first question asked the participants to tell which app they chose to use.

Question 1: which application did you choose?	
QUESTIONNAIRE 1 (10/11/2022, 3 days after beginning of experimentation)	QUESTIONNAIRE 2 (13/11/2022, 6 days after beginning of experimentation)
• *Duolingo* (15 subjects, 75%) • *Memrise* (4 subjects, 20%) • *Drop* (1 subject, 5%)	• *Duolingo* (14 subjects, 70%) • *Memrise* (4 subjects, 20%) • *Drop* (1 subject, 5%) • *Bubble* (the subject probably meant *Babbel*, 1 subject, 5%)

Table 5: Applications chosen by the participants for the first week of experimentation.

A level of consistency can be noticed in the results of Table 5, with the most notable aspect being one subject who switched from *Duolingo* to *Babbel* between the first and second questionnaire.

When it comes to actual app use, the second question brings interesting results, especially in the second questionnaire:

Chart 5: days that users had been using the application they selected.

As we can see, some users started using the app well before the experimentation time, allowing for a more dedicated knowledge of content provided.

The third question asked participants to say if they were still using the app they chose, with 17 participants answering affirmatively (85%) and 3 (15%) answering negatively. With comparison to the second questionnaire, the number of participants who reported using the same app increased (19, 95%), with only one participant that changed app.

The devices employed for app use were unanimously the smartphone through both questionnaire (20 subjects, 100%), with one subject also using his computer due to issues with the memory storage of their smartphone (1 subject, 5%).

When asked if participants used other material in conjunction with the app, some things are worth noting, as shown in the following table:

Question 5: Did you implement other technologies/methodologies in conjunction with the app you chose?	
QUESTIONNAIRE 1 (10/11/2022, 3 days after beginning of experimentation)	QUESTIONNAIRE 2 (13/11/2022, 6 days after beginning of experimentation)
• Online dictionaries (7 subjects) • Movies, Podcasts, TV series, etc. (5 subjects) • *YouTube* videos (5 subjects) • Language manuals (1 subject)	• Online dictionaries (6 subjects) • Movies, Podcasts, TV series, etc. (9 subjects) • *YouTube* videos (5 subjects) • Language manuals (2 subjects)

• Other apps (*Babbel*), and other technologies (including songs and a university course provided by a language center) (3 subjects) • Nothing (1 subject)	• Other apps (*Tandem*) and university language course (2 subjects) • Nothing (3 subjects)

Table 6: tools used by participants during the first week alongside language learning apps.

As noticeable in Table 6, between the two questionnaires there has been an increase on use of movies, podcasts and TV series to accompany language learning, a practice that is the basis for language learning app approaches such as *FluentU*. Also noticeable is the increase of subjects who decided to add nothing to what the app was providing them.

The following question asked participants to indicate how much time they spent on the app, as most of them allow for learning sessions whose length is decided by the user.

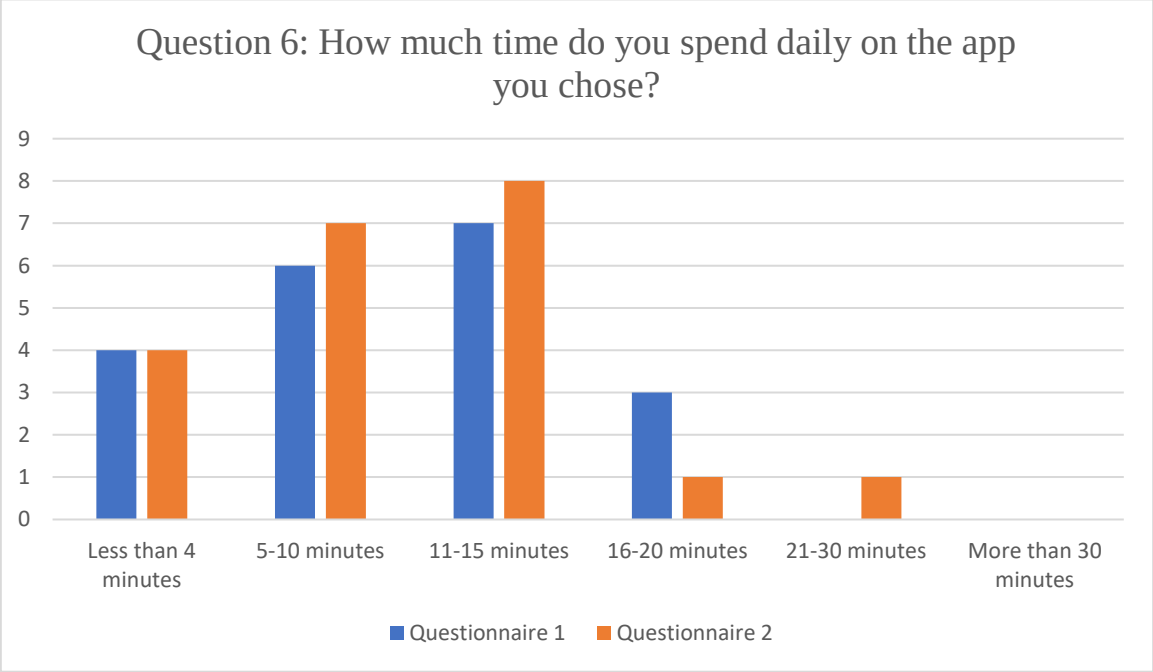

Chart 6: time spent daily by participants on language learning apps during the first week of experimentation.

As can be seen from the results in Chart 6, there was an increase in participants that spent less time on the app as time passed, with one user incrementing it. One participant also reported a fluctuating period of use, with sessions between 5-10 minutes and other sessions between 11-15 minutes.

When asked what they liked and did not like about the app chosen, users were consistent in their answers in both questionnaires:

WHAT PARTICIPANTS LIKED	WHAT PARTICIPANTS DID NOT LIKE
• Ease of use • Intuitiveness • Possibility to practice vocabulary • Receiving immediate feedback after activities • Diversity of activities presented • Few materials per session, allowing for easier memorization of content • Videos with native speakers, useful for pronunciation • Gamification elements and a sense of challenge, useful for keeping motivation high • Apps that are considered well structured, with users working by clear objectives	• Annoying notifications and advertisements • Confusing layout • Bugs • Lives taken for every mistake (a gamification element that hindered learning by limiting sessions) • In-app purchases that do not allow users to take advantage of useful learning functions • A sense of anxiety produced by the app • Translation issues and repetitiveness • Difficulty of content presented that does not correspond to users' previous language knowledge • A lack, sometimes complete, of activities which focus on grammar, reading, communicative functions and speaking • Focus on memorization and not on inductive language learning

Table 7: What participants liked or disliked about language learning apps during the first week

The most interesting comments in Table 7 relate to a sense of superficial easiness of learning, and in general a superficial knowledge of language presented to the participants. The apps generally do not give instructions to the users, rather presenting material as is. One of the users, who is learning Japanese, cited a lack of activities on kanji and writing ideograms, something important to the language he is studying. There is, therefore, a sense of homogeneity in language courses presentation that does not consider the necessities of specific languages and what users might need to learn. One of the comments considered these apps as made with a tourist's point of view, and the comparison with travel guides is apt: the applications present content, usually superficial content, without considering all the other aspects necessary for language learning that might be needed, nor is any reflection on the part of the user required.

The languages participants decided to learn through language learning apps vary, with the most studied being English and German (5 users, 25% for both), followed by French (4 users, 20%) and Spanish (3 participants, 15%).

When asked about what aspect of language learning users decided to focus on, the results showed changes between the two questionnaires:

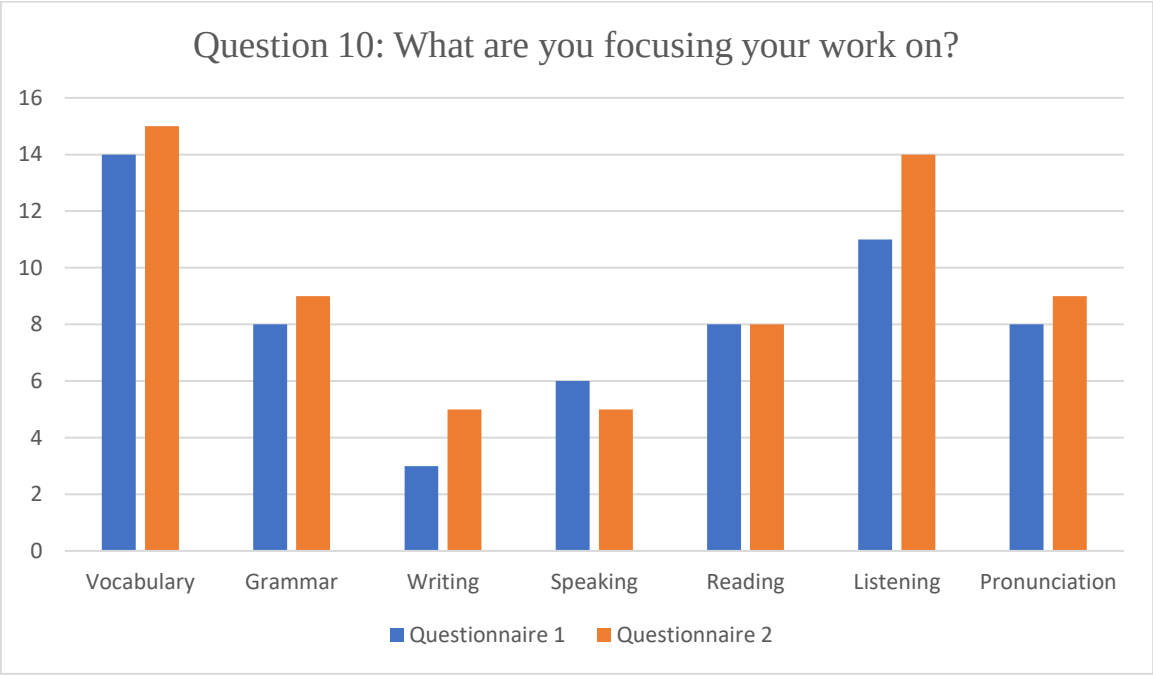

Chart 7: Language skills the learners focused on during the first week of experimentation

As we can see in Chart 7, there has been an increase in participants focusing on specific categories which language learning apps base most of their content on, specifically vocabulary, listening, and pronunciation.

The following question asked participants to consider if they changed language learning apps or not. The first questionnaire shows a situation in which participants are attempting to find the right app for them, with examples such as the following comments:

> I used Babbel the first day and Duolingo the other two. (S.5)
>
> Yes, I also tried *Rosetta Stone* and *Duolingo* (S.6)
>
> .
>
> I initially chose *Cake*, but I uninstalled it after ten minutes because it was difficult to understand how it worked. (S.7)

The second questionnaire, meanwhile, shows a situation in which 19 out of 20 subjects reported using the same app since the other questionnaire, showing consistency.

When asked why they changed applications, those that did cited reasons such as a less intuitive design, lack of motivation, and especially the presence of content hidden behind a paywall, such as with *Babbel* and *Rosetta Stone*. This design choice effectively limits language learning and what users can learn.

Finally, when asked what they might want from a language learning app, participants reported wanting more focus on grammar and dedicated grammar content, i.e., through handouts or flashcards. Other aspects participants would have liked to focus on include discovering about the culture the language is used into, pragmatics, dialogues, reading from newspapers or literary sources, a dictionary, and the possibility of language transfer, i.e., analogies between L1 and L2/FL, starting from what is known in the source language and find similarities with the language studied to facilitate learning.

Second week

The questionnaires delivered in the second week analyzed the experimentation after nine and twelve days from starting respectively. The first question, about what language learning apps the participants were using, showed an interesting aspect in the third questionnaire:

Question 1: which application did you choose?	
QUESTIONNAIRE 3 (16/11/2022, 9 days after beginning of experimentation)	QUESTIONNAIRE 4 (19/11/2022, 12 days after beginning of experimentation)
• *Duolingo* (15 subjects, 75%) • *Memrise* (3 subjects, 15%) • *Drop* (1 subject, 5%) • *Babbel* (1 subject, 5%)	• *Duolingo* (14 subjects, 70%) • *Memrise* (4 subjects, 20%) • *Drop* (1 subject, 5%) • *Babbel* (1 subject, 5%)

Table 8: Applications chosen by the participants for the second week of experimentation.

As noticeable in Table 8, during the third questionnaire two of the subjects that were using *Duolingo* also experimented with other apps, specifically *Mondly* and *Cake*, e.g., starting to use *Cake* for learning English and keeping *Memrise* for learning French. The results for the fourth questionnaire, meanwhile, mirror those of the second questionnaire during the first week.

The following question, regarding how long subjects were using the apps chosen, mirrors these results, with some reporting different use times for the apps they experimented with, e.g., using *Memrise* for two weeks and *Mondly* for two days, and the fourth questionnaire being consistent with the results of the first question. Some users had been employing these apps from before the experimentation period, but they stuck to the app chosen.

The third question, which asked participants if they were still using the app they chose, shows results that are opposed to the previous questions. In the third questionnaire 18 subjects (90%) kept using the same app, while in the fourth questionnaire the percentage was slightly lower (17 subjects, 85%).

The question about the devices used shows a decrease in participants using the computer for language learning apps (from 2 subjects in the third questionnaire to 1 subject in the fourth). The main aspect that could be considered is the dominance of smartphones for MALL and language learning apps. Most apps are not adapted for computers or do not possess versions that function on computers. This aspect is also linked to the ease of use these apps provide, which is one of their main positive aspects from a user's perspective.

When it comes to what technologies users implemented along with the app they chose, some interesting aspects appear:

Question 5: Did you implement other technologies/methodologies in conjunction with the app you chose?	
QUESTIONNAIRE 3 (16/11/2022, 9 days after beginning of experimentation)	QUESTIONNAIRE 4 (19/11/2022, 12 days after beginning of experimentation)
• Online dictionaries (7 subjects) • Movies, Podcasts, TV series, etc. (5 subjects) • *YouTube* videos (4 subjects) • Language manuals (2 subjects) • Other technologies (including online grammar tests and a university course provided by a language center) (2 subjects) • Nothing (3 subjects)	• Online dictionaries (9 subjects) • Movies, Podcasts, TV series, etc. (8 subjects) • *YouTube* videos (6 subjects) • Language manuals (2 subjects) • University language course (1 subject) • Nothing (3 subjects)

Table 9: tools used by participants during the second week alongside language learning apps.

Despite the previous questions, none of the users reported using other apps as a form of additional learning material to their main app, as can be seen in Table 9. The increase in online dictionaries' use mirrors other comments made by the participants about the desire to have a dictionary as a fixed part of language learning apps, while the increase in audiovisual media such as movies and *YouTube* videos is linked to needs such as the case of a participant whose desire was watching Japanese anime and started watching episodes with subtitles, slowly starting to watch clips without them.

When analyzing time spent on the app, the comparison is not only between the two questionnaires, but also to the results the previous week.

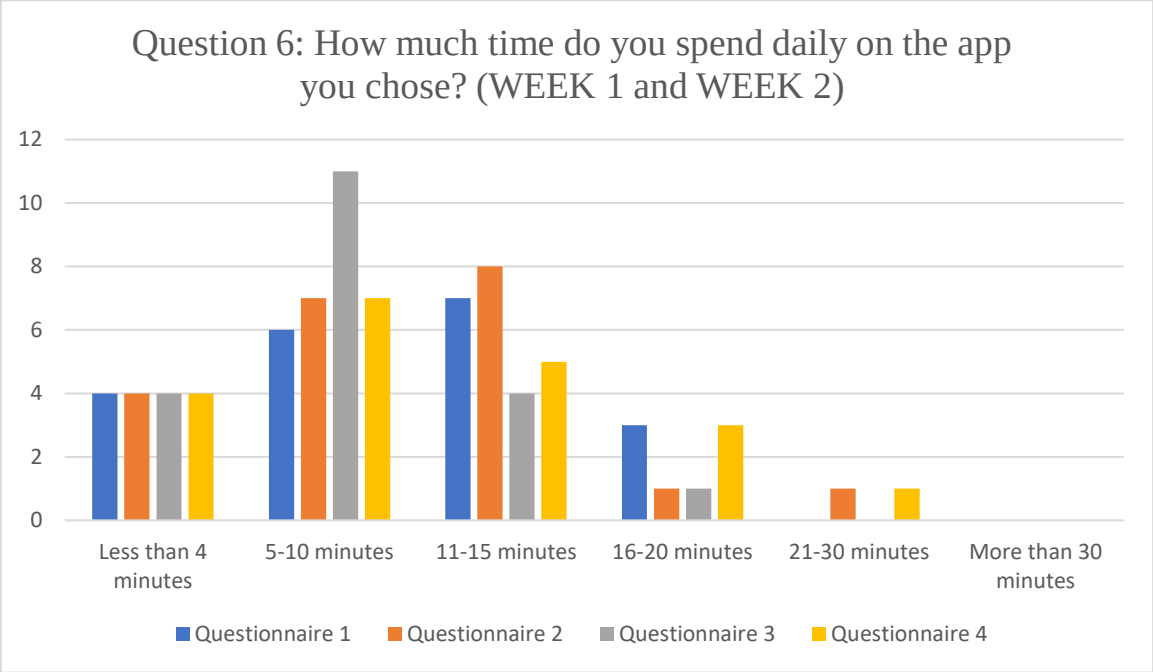

Chart 8: time spent daily by participants on language learning apps with comparison between the first and second week of experimentation.

The results in Chart 8 show how the third questionnaire is the peak of an increase in lower time spent on the app, with most users spending between 5-10 minutes on the app, while in the first week the most numerous group was that of users who spent 11-15 minutes. After the third questionnaire, the numbers are consistent with the results of the second questionnaire, and the general decrease in use time is notable, especially considering their almost daily use of the apps chosen. The inconsistent increase in longer use times (16-20 minutes and 21-30 minutes) for some participants is an interesting aspect worth analyzing for the results of the third week.

When asked what users liked and did not like about their apps, the results were consistent with those of the first week, citing interactivity, intuitive app and activity designs, pronunciation tips, ease of use and gamification elements as positive aspects. The negative aspects include anxiety from gamification elements, content locked behind paywalls, lack of activities including grammar, more complex listening, bugs, confusing app design, and lack of language difficulty and challenge. Some comments also highlighted how the apps started to become boring and repetitive. The most interesting comments, both positive and negative, had to do with reviews of specific apps. *Memrise* was criticized for its insistence on placing test, while *Mondly* and *Cake* both received positive appraisals from the participants that used them:

> I really like *Mondly* because it has a more orderly and schematic division of learning units, almost as if it was a book, it insists a lot on activating several neuronal areas (when you learn something you are shown a picture of the brain in which the areas activated light up). *Mondly* is more focused on behavior than multiple choice (instead of multiple choice it prefers writing with a keyboard). Furthermore, *Mondly* makes learning more personalized since it asks about areas of interest. (S.8)

> [talking about *Cake*] Everything! Love at first sight: the fact that it is like learning English by watching a movie with subtitles, but with the added bonus of practicing and understanding what the actors are saying line by line. (S.9)

> I like the possibility to work on a single verb and its various uses: this is done through a very clear explanation and a series of activities. I like it because it is fun, and everything is well done, as far as what I've tried today. I like that the level is high from the beginning, I speak English enough, but not with much confidence. This application seems the perfect one to reach that confidence in everyday speaking that I'm currently lacking. (S.10)

While the languages studied appear consistent with the first week in the third questionnaire, participants started trying other languages in the fourth questionnaire: English is still the most studied language by the participants (6 subjects), followed by German (5 subjects), French and Spanish (3 subjects respectively). But users started to learn various languages at the same time, with one user studying German, French and Spanish, while another user decided to focus on Portuguese, Arabic, and Irish.

The results of the question regarding what aspect of language learning users decided to focus on mirrored the previous week:

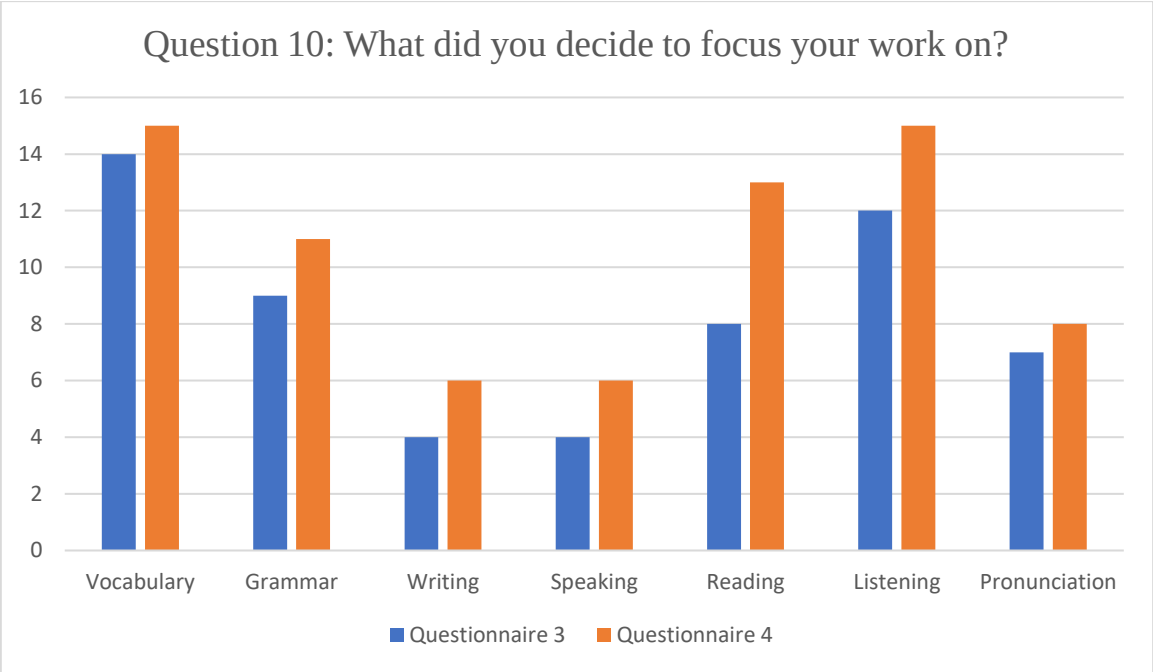

Chart 9: Language skills the learners focused on during the first week of experimentation.

As noticeable in Chart 9, a low number of participants focusing on writing and speaking might reflect how applications do not usually provide content and materials that involve those skills, with the high percentage of subjects focusing on vocabulary and listening being more indicative of how the apps work.

During the days between questionnaires 2 and 3 only one subject reported switching apps entirely, from *Memrise* to Duolingo. The reason given for this was that *Memrise* had a less intuitive design and was not appealing graphically. A similar situation happened between questionnaires 3 and 4, with only one subject that reported using additional apps.

Finally, when asked what aspects participants would like to focus on, specifically referring to elements not present in the apps given, the answers were the same as those in the questionnaires of the first week: more practice on speaking and conversations with native speakers, more content based on grammar, elements of culture and pragmatics. In general, participants express the desire to build an active use of the language, something that they can use practically in their everyday lives.

Third week

The following questionnaires were provided during the last week of experimentation, fifteen and eighteen days after the beginning of the experimentation period. The results of the first question, about what applications the subjects chose, showed a trend of consistent variety after the shifts of the second week:

Question 1: which application did you choose?	
QUESTIONNAIRE 5 (22/11/2022, 15 days after beginning of experimentation)	QUESTIONNAIRE 6 (25/11/2022, 18 days after beginning of experimentation)
• *Duolingo* (15 subjects, 75%) • *Memrise* (2 subjects, 10%) • *Drop* (1 subject, 5%) • *Babbel* (1 subject, 5%) • *Cake* (1 subject, 5%) • *Mondly* (1 subject, 5%)	• *Duolingo* (15 subjects, 75%) • *Memrise* (2 subjects, 10%) • *Drop* (1 subject, 5%) • *Babbel* (1 subject, 5%) • *Cake* (1 subject, 5%) • *Mondly* (1 subject, 5%)

Table 10: Applications chosen by the participants for the third week of experimentation.

The results in Table 10, equal between the two questionnaires, provide some clear insights: while *Duolingo*'s use base has been very high, due to popularity of the app or actual benefits provided, *Memrise* has seen a steep decline in use, or has been used in combination with other apps, such as *Mondly*. While the results of the second question show a continued use of apps that sometimes has been progressing for a long time (alternating for a few months since 2018 according to one subject), the third question showed a progress consistent with a situation that has settled: in the fifth questionnaire those that reported using the same applications since the last questionnaire were 18 subjects (90%), with 2 subjects (10%) reporting that they changed.

In the sixth questionnaire, the percentage of participants that changed app included only one subject (5%). The devices used continue being mainly the smartphone (19 subjects, 95% on both the fifth and sixth questionnaire), with a minority of participants using their computers (2 subjects, 10%). This could be done as a way to continue working with the app while using the smartphone is not available, or because of smartphone issues such as memory capacity. In the fifth questionnaire only, a participant reported also using their tablet.

When asked if they implemented other materials aside from the apps chosen, these were the answers given by participants:

Question 5: Did you implement other technologies/methodologies in conjunction with the app you chose?	
QUESTIONNAIRE 5 (22/11/2022, 15 days after beginning of experimentation)	QUESTIONNAIRE 6 (25/11/2022, 18 days after beginning of experimentation)
• Online dictionaries (9 subjects) • Movies, Podcasts, TV series, etc. (9 subjects) • *YouTube* videos (6 subjects) • Language manuals (4 subjects) • University course provided by a language center (1 subject) • Nothing (3 subjects)	• Online dictionaries (11 subjects) • Movies, Podcasts, TV series, etc. (7 subjects) • *YouTube* videos (4 subjects) • Language manuals (4 subjects) • University language course (1 subject) • Nothing (4 subjects)

Table 11: tools used by participants during the third week alongside language learning apps

While the dominance of online dictionaries and translators is evident throughout the questionnaires presented in Table 11, three aspects are of note: the lack of other apps and online resources as additional material, the increase in participants that decided to add nothing aside from their main app of choice, and the increase in use of language manuals and exercise books. When considering the time spent by users on the app, the comparison will be done with the results of the second week:

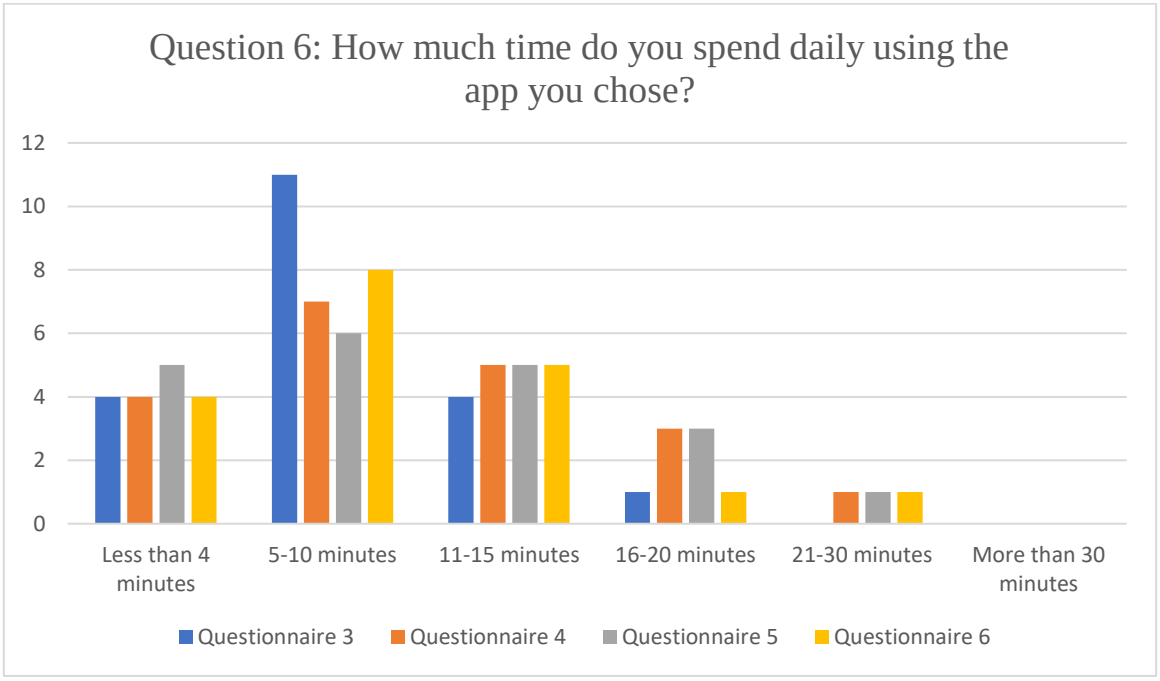

Chart 10: time spent daily by participants on language learning apps with comparison between the first and second week of experimentation.

As observable from the data in Chart 10, the largest group of participants are those that practice for 5-10 minutes daily, followed by the group that practices for 11-15 minutes. The trend of alternating practice for those between 16-20 minutes repeats from the previous two weeks, and there is the case of one subject that consistently practiced 21-30 minutes daily for three consecutive questionnaires, indicative of a potentially high level of motivation considering the declining times for app use during the experimentation period.

When asked about what they liked or did not like about the apps, the answers given by the participants were consistent with what discussed the previous two weeks:

WHAT THE PARTICIPANTS LIKED:	WHAT THE PARTICIPANTS DID NOT LIKE:
• Presence of pronunciation tests (in *Mondly*) • Gamification elements • Interactivity • Corrections given • Variety of activities • Feeling of learning something useful • Sense of challenge • The possibility of saving content you want to focus on later • Easiness of introducing someone to a specific language • A sense of community	• Lack of grammar and speaking • Repetitive activities • Sometimes the app and challenges proposed are too fast • The content proposed is basic vocabulary, with nothing applicable to concrete contexts • Slower than university language course • Annoying notifications, bugs, and in-app advertisements • Lives and gamification elements can limit use • The feeling of not learning much • Standardized activities • Distractors that are not related to the questions and make the reasoning for finding an answer easy

Table 12: What participants liked or disliked about language learning apps during the first week.

In general, some of the participants seem to have found everything there is to do with their app and are not satisfied with the results, as noticeable in Table 12. When asked what they liked about their app, one of the subjects answered:

> At this point, nothing (S.11).

Other subjects made comparisons to traditional language learning, praising its effectiveness compared to applications. It is interesting to note that only in the sixth and final questionnaire, did one of the participants mention the use of forums and community to motivate learning,

something that the literature mentioned as well. Most users seemed to not focus on this aspect as well when using language learning apps.

When asked what language the participants were learning, there were some differences between the fifth and sixth questionnaires:

Question 9: What languages are you learning?	
QUESTIONNAIRE 5 (22/11/2022, 15 days after beginning of experimentation)	QUESTIONNAIRE 6 (25/11/2022, 18 days after beginning of experimentation)
• English (6 participants, 30%) • German (5 participants, 25%) • French (3 participants, 15%) • Portuguese (2 participants, 10%) • Spanish (2 participants, 10%) • Japanese (1 participant, 5%) • Swedish (1 participant, 5%) • Irish (1 participant, 5%) • Dutch (1 participant, 5%) • Bokmål Norwegian (1 participant, 5%)	• English (6 participants, 30%) • German (5 participants, 25%) • French (3 participants, 15%) • Portuguese (2 participants, 10%) • Spanish (2 participants, 10%) • Japanese (1 participant, 5%) • Swedish (1 participant, 5%) • Bokmål Norwegian (1 participant, 5%)

Table 13: Languages learned by participants during the third week of experimentation.

The most notable aspect in the results of Table 13 is the lack of Irish and Dutch in the following questionnaire.

When asked what subjects decided to focus their work on, these were the results:

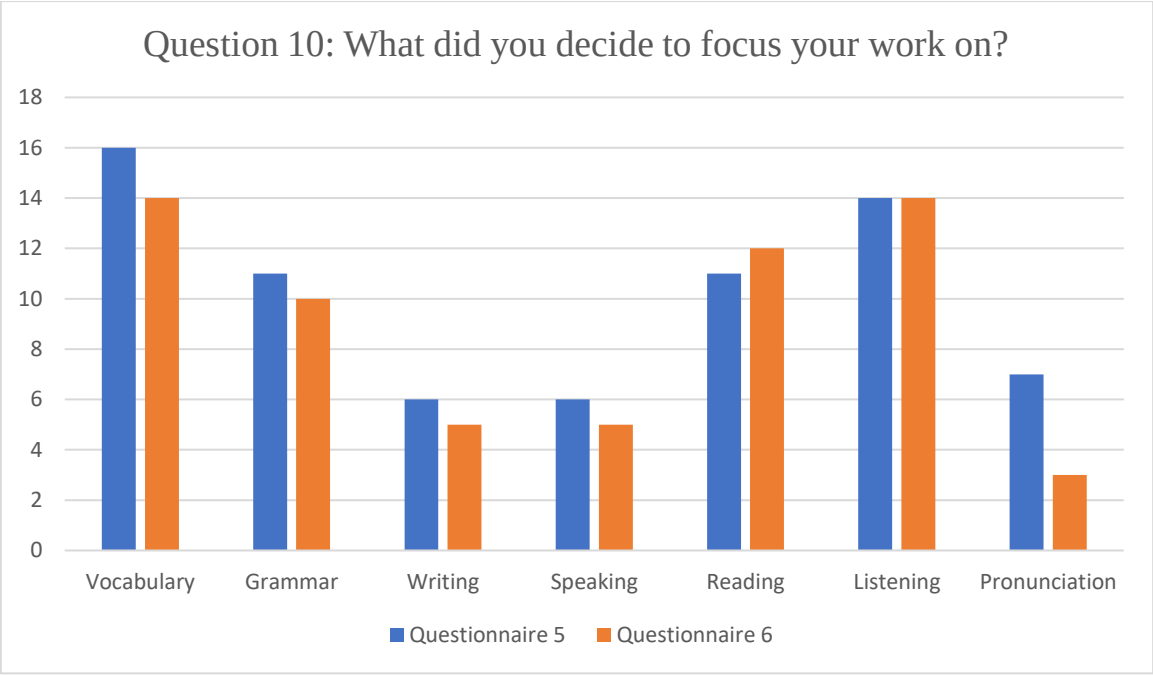

Chart 11: Language skills the learners focused on during the third week of experimentation.

Once again, as can be seen in Chart 11, the focus appears to be mostly on vocabulary, reading and listening, with low levels of speaking and writing. The low percentage of participants that focused on pronunciation is visible. The high percentage of subjects that focused on grammar reflects the desire of participants to focus on this topic, as was expressed in every questionnaire during this experimentation.
Participants were consistent in app use, with some implementing desire to try different apps in the future, such as the following comments:

> I've been recommended *Cake*, and I'll try it soon (S.12).
>
> I added *Mondly* (S.13).

There is still the desire to try new apps, new approaches and methodologies to deepen and motivate language learning and a sense of curiosity in the participants. The subjects have a clear idea of their objectives and what they want to focus on, as they expressed in the answers for the final question of the survey, regarding what they would like to focus on: more speaking and focus on dialogues, more reading, activities that focused on logic and inductive reasoning instead of rote memorization, and dedicated grammar files.

3.4.3 Final questionnaire

The first question asked participants to consider what foreign languages they knew before the experimentation period. The results are the following:

- English (20 subjects, 100%)
- French (9 subjects, 45%)
- Spanish (9 subjects, 45%)
- German (5 subjects, 25%)
- Norwegian (2 subjects, 10%)
- Greek, Arabic, Russian, and Swedish (1 subject each, 5%)

Some of the users also gave specific level indications, such as basic English, B1 French or A1 Spanish, according to the CEFR levels. It would be interesting to compare the results of the first question with the results of the second question, asking participants what languages they studied during the entirety of the experimentation period.

FINAL QUESTIONNAIRE (ASSIGNED ON 29/11/2022, 22 DAYS AFTER BEGINNING OF EXPERIMENTATION)	
QUESTION 1: What foreign languages did you know before the experimentation period?	**QUESTION 2: What language/-s did you study during the experimentation period? Think about the entire three-weeks period (e.g., I started with Spanish and changed to Swedish)**
• English (20 subjects, 100%) • French (9 subjects, 45%) • Spanish (9 subjects, 45%) • German (5 subjects, 25%) • Norwegian (2 subjects, 10%) • Greek, Arabic, Russian, and Swedish (1 subject each, 5%)	• English (6 subjects, 30%) • German (5 subjects, 25%) • French (4 subjects, 20%) • Portuguese (2 subjects, 10%) • Spanish (2 subjects, 10%) • Swedish (1 subject, 5%) • Bokmål Norwegian (1 subject, 5%) • Japanese (1 subject, 5%)

Table 14: Comparison between languages known by the participants before the experimentation period and what they practiced with language learning applications.

The results of Table 14 show that English, though in various levels, is an established and known language for all participants. Its importance was also seen during the experimentation, where it was consistently present as the language that was most studied by the sample, followed by German and French. The results of the second question in particular show that all the participants found a main language to focus on, not considering eventual detours they might have done during the experimentation, as detailed in the analysis of each questionnaire.

The reasons for choosing a specific language varied, and each participant gave their own reasoning: understanding this has its importance, as the decision to study the language must be taken according to user flexibility, needs, and interests. Otherwise, the learning process could be arduous. Decision made in the absence of complete information and without a realistic appraisal of what it can take to succeed can lead to disappointment and demotivation (Roberts; Kreuz, 2016, p.12). The most frequent were motivations based on curiosity and personal knowledge, followed by the desire to travel in the future; these are all intrinsic motivations, very effective for learning in general. Another example of intrinsic motivation represented was the sense of curiosity towards a certain culture.

> Culture, possible use in case of a trip to Japan. (S.14)
>
> I love the sound of the language, francophone culture and literature. I love the French cities. Plus, I had already studied it in middle school, and I wanted to improve it. (S.15)
>
> Because I always wanted to learn it [German] and I'd like to live in Germany. (S.16)
>
> When it comes to extrinsic motivations, the most common were study and work-related reasons, such as those expressed in the following comments:
> Because English is at the basis of global communication. I use it almost every day for work. In addition to this, I'd like to use it to make new acquaintances. (S.17)
>
> To better face job interviews. (S.18)
>
> [I chose] French to brush it up from middle school and to prepare for a possible need to know the language in the future for a master's degree, then [I chose] English because I wanted to improve my level in this language. (S.19)

When it comes to the choice of language studied, more than half of the sample chose to focus on a language they had already studied or did not know well (11 participants, 55%), while another part of the sample decided to focus on languages they did not know at all (8 participants, 40%). Lastly, one subject (5%) decided to focus on both a language that they did not know and one they wanted to improve.

The following questions asked the participants to reflect on the experimentation period and its results. First, the subjects were asked if they thought to have learned something from using language learning applications. The results were mostly positive, with most participants reporting improvements in areas such as listening, pronunciation, and especially vocabulary learning. A few comments mentioned grammar but focused on its limited presence on apps or how the participant learned most grammar from other sources, such as university language courses. Two comments in particular also reported not learning much from the experimentation period, with one comment reporting that some benefits might show only through protracted use of the applications.

Then the participants were asked to consider if their opinion on language learning apps changed during the course of the experimentation. The results were mostly affirmative, with some participants having a new, positive opinion regarding language learning applications. The main positive points they referred to were:

- Interactivity
- Ease of use
- Well structured
- Intuitiveness
- Presenting another perspective on language

Some specific applications were praised, specifically *Cake* for its motivation through movie clips, well-structured content including grammar and pronunciation tests, and practical communicative functions. Some comments were more negative, with users emphasizing how these apps are not enough on their own, but need to be accompanied by something else, such as a grammar manual or language courses.

> Meh, applications are certainly a useful way to practice, but I think in the end nothing can replace a course by a native speaker. An application lacks (for now) the capacity to give a sense of "personalization" to its lessons. (There are AI concepts on Duolingo that attempt to do so, but they are still in their infancy). (S.20)

Another interesting aspect was how more complete and functional applications are inaccessible without paying, so users who cannot afford the premium options have to compensate with applications that can have less content and variety.

> […] *Duolingo* is not enough to learn a foreign language and use it every day, but other applications (e.g., *Babbel*) made me curious, because they seem to teach sentences and conception more applicable to everyday life. I did not look into it, and I stuck to *Duolingo* because other applications asked for a paid subscription I couldn't pay, and in addition to this *Duolingo* was compensated by the university language center course. (S.1)

When asked if they used the same app for the entirety of the experimentation, most of the participants reported that they stuck to the app they chose.

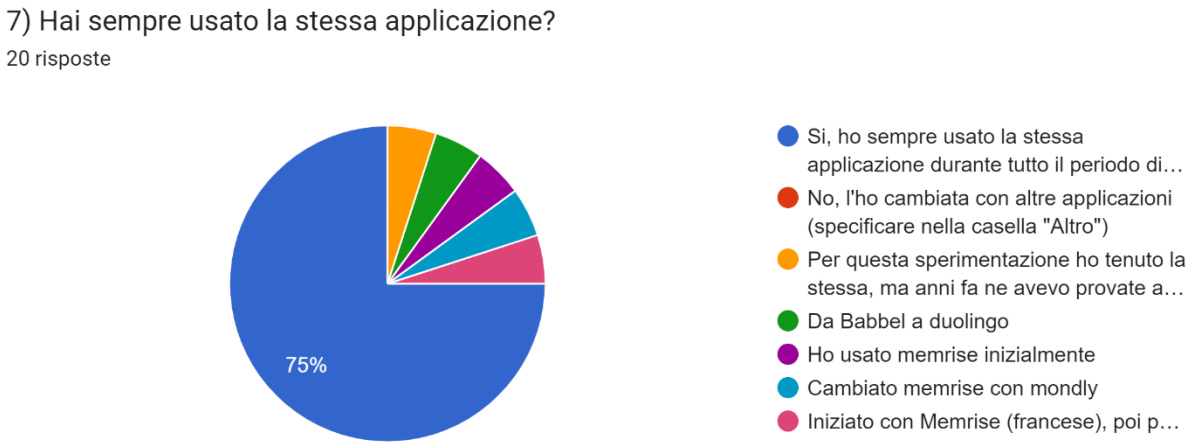

Chart 12: Pie chart showing if participants used the same application during the course of the experimentation.

As can be seen in Chart 12, 80% of participants (75% + 5% from one comment that reported using different apps in the past but not during the experimentation period) kept using the same application for the entirety of the three-weeks period. The limits of language learning applications were indicated by the participants several times, but most never changed their application of choice during the course of the experimentation, implementing additional material if needed. What is interesting to note is that most changes reported involve *Memrise*: according to participants, the app is less efficient because it is perceived as boring and less interactive, with repetitive activities, confusing timing for revision and when to learn new content, and quizzes that were not perceived as enough challenging.

Finally, when asked if they would recommend the applications used during the experimentation period to other users, the responses were almost unanimously affirmative. Once again, the main reasons for using language learning applications are their ease of use, interactivity, gamification elements, constant engagement with language and possibility to learn vocabulary and grammar. Participants noted the lack of practice for useful skills such as speaking and suggested using language learning applications as a break from traditional language learning, rather than the only approach to learning a new language. Even the best language learning apps are seen as another tool that learners can use to practice foreign languages, or a starting point to approach a new language. As summed up in the following comment:

[…] If [users] do not have much time it is handy, if they have time and can also follow a language course, [the app] is still handy as a tool for personal improvement (even if it might not be necessary). (S.2)

CHAPTER 4: Discussion

This chapter will discuss the research questions posed throughout this thesis and considering the literature presented in chapters 1 and 2. Then, some insights for further research and development of language learning applications will be proposed.

4.1 RQ1: What are subjects' opinions and knowledge of MALL technologies?

Subjects' opinions and knowledge of MALL technologies had some variations during the entirety of the experimentation. Most subjects already had previous experiences with language learning applications and were able to give ample criticism on them during the introductory questionnaire. *Duolingo, Babbel, Memrise*, and *Rosetta Stone* were the language learning applications most known and used by the subject group prior to experimentation, but their use varied through time, with a sense of progressive experimentation on the part of some subjects who decided to use two applications at a time (e.g., using *Cake* for English and *Memrise* for French). Specifically, starting from the second week of experimentation, participants started testing different applications, which might be a sign of declining motivation or curiosity to see what could be implemented: other apps might have also been used as a comparison with the main app or used to compensate for what was lacking in the main app and adding depth to the subjects' learning experience. The only application that saw a constant drop in use was *Memrise*, for reasons that range from boring and confusing application design to repetitive and useless language items. The most used application, with consistent use percentages, was *Duolingo*. Despite its flaws, participants integrated additional content and found it engaging and entertaining.

Language learning applications were also thought as useful for learning a foreign language without previous knowledge, or for studying an already known language because of academic or work reasons, with an approach capable of combining study and leisure time.
At the same time, both prior and during the experimentation period, participants were able to give criticism on lacking aspects of language learning application and telling what changes language learning applications could benefit from. Some aspects reported include less repetition

in sentences and activities, more complexity from items, the possibility to practice other language skills and interacting with the target culture.

Language learning applications were also considered by participants as capable of providing only the superficial easiness of learning a foreign language, presenting simplified content as it is, without reasoning needed on the part of the user. This oversimplification extended also to a sense of homogeneity in language courses that did not take into account key aspects of specific foreign languages: one of the subjects, which was studying Japanese, reported a lack of activities on writing ideograms, a key component of the language.

Overall, language learning applications were considered slower and not as useful as traditional language courses. Despite this, most participants reported improvements in listening, pronunciation, and vocabulary. Some users reported not learning much, though admitting that protracted app use might be beneficial. Some of the subjects ended the experimentation period with a new, mostly positive opinion regarding language learning applications, and most participants reported they would recommend apps to other learners, if only as another tool to use, and as a break from traditional language learning, with limitations and aspects that might be improved through additional material.

Comparing the results of this experimentation with other studies found in the literature evidences some differences and similarities.

In contrast with the results of this thesis, Tran's (2020) study on tertiary TESOL (Alexander, Murphy, 1999) teachers in the context of Vietnam found thar self-directed MALL can be used by participants to facilitate an active language development, recognizing personal learning needs, and customizing their learning experience, as opposed to the limitations and impersonality recognized in this study (Tran, 2020, p. 179), though it should also be noted that teachers and other adult learners may have different needs and different experiences, attitudes, and behaviors towards language learning (Tran, 2020, p.195).

Some data is similar to what reported by participants. Maintaining motivation has also been reported in the literature as one of the main concepts in MALL and language learning applications, as motivation is a factor that has a relevant impact on learners' decisions to start engaging or keep learning with a technological tool (Tran, 2020, p. 163). The decrease in motivation reported by participants was also reported by Shortt et al.'s literature review on *Duolingo* studies, along with the lack of content and possibility to practice language skills such as grammar, writing, and speaking in real-life contexts. Another aspect reported by participants

and present in the literature review is the feeling of learning simplified content (Shortt et al., 2021, p.22). Other aspects reported by participants and in the literature are the perceived usefulness and perceived ease of use of MALL, having a positive perception of the technology despite its flaws. These results are evident in Azli et al.'s study (2018) with vocational college students, which also reported how MALL can be useful for providing an engaging experience, detached from traditional language learning (Azli et al., 2018, pp. 95-96).

Another point which was identified in both the literature and experimentation is the sense of dissatisfaction applications can lead to, especially through frustration due to item repetitiveness, absence of communication with other learners, or other life changes which might lead to demotivation. This aspect was reported by Van der Poorten Sawyer in her study with recreational learners at Queensland's University, retirees and refugees of different English fluency (Van der Poorten-Sawyer, 2020, pp. 68-70, p. 182). The limitations imposed by applications, with features behind paywalls that hinder language learning was another aspect found in experimentation data (Van der Poorten-Sawyer, 2020, p. 185).

An example of clear contrast between results in the study and experimentation is Fathi et al.'s study (2019) on *Memrise* following 59 Iranian students, at a Master-of-Arts university degree level, between 21 and 33 years of age (Fathi et al., 2019, pp. 32.33). The results of the study presented *Memrise* as an engaging app, capable of improving language skills and fostering learner autonomy (Fathi et al., 2019, pp. 38-39). The experience presented by the participants in the experimentation was the opposite, with subjects abandoning *Memrise* for being repetitive, with items without use, and perceived as confusing and unappealing. *Memrise* was also the focus of Gonzáles-Valencia et al.'s study (2020) with students of a second-semester English class, with results of the study reporting how *Memrise* might be useful for improving overall language learning in combination with a traditional language course. Though *Memrise* was considered lackluster, and there are better applications available, the idea was also reported by participants in the experimentation of this thesis (Gonzáles-Valencia et al., 2020, pp. 280-282).

Other important elements reportedly lacking in applications according to the participants were considered by Moron (2019), with her study focusing on 61 volunteers from 14 to 49 years of age, which were asked questions about smartphone use, knowledge of MOOCs, and what MALL technologies are most employed (Moron, 2019, pp. 21-28). The elements participants of that study considered important inclusions into language learning applications include the possibility to have video-calls to practice speaking, writing texts or summaries of content

learned, having a grammar assistant, and working on vocabulary through synonyms or with the app giving one word a day. Other activities reported in Moron include the possibility to shoot videos, create word quizzes and games, and having translation activities, a dedicated area of the app for learning about culture, and more listening and reading exercises (Moron, 2019, p. 52). Most of these concepts were also reported by the participants of the experimentation in this thesis.

4.2 RQ2: What are the advantages and disadvantages of a MALL approach?

Among the advantages of a MALL approach and of the language learning applications reported, participants mentioned the feeling of informal learning provided and the ease of use of language learning applications. Apps were also praised for the content provided, based on selected topics and presented through clear objectives and a diversity of activities compared to traditional learning. Linked to this detachment from traditional language learning is the possibility of receiving immediate feedback on language production and the possibility for revision anytime the user wants, allowing for the possibility to quickly check the user's improvement. The intuitiveness and interactivity of language learning applications was also praised, along with shorter lesson timespans, the use of pictures to learn content, and few materials per learning session, which allow for easier memorization. The possibility of saving content to focus on later was also considered a positive aspect by participants. Language learning applications were considered a useful tool for practicing vocabulary, and for hearing the correct pronunciation of foreign languages.

The added feature of gamification elements (checkpoints, ranking systems, scoreboards) and a sense of challenge were also considered positively. Applications such as *Mondly* and *Cake* were overall considered engaging and effective because of their approach: *Mondly* was reported as having an orderly and schematic division of learning units, focusing on constructing learning behaviors rather than rote memorization, preferring activities on writing, having pronunciation tests, and focusing on personalized areas of interests. Meanwhile, *Cake* was praised for its motivating approach, analyzing language through subtitled clips from movies and tv shows, practicing understanding line by line.

Finally, one subject also mentioned the fact that language learning apps can help foster a sense of community with fellow learners through forums and group chats.

The possibility for applications to be used as a way to motivate learners through exposure to authentic material has been reported in the literature, such as Gonulal (2019), who collected data from 97 *Instagram* users from various countries who used the app for watching content in English (Gonulal, 2019, p. 313, p.318). Being a social media app, *Instagram* could also be used for direct communication with other learners, a function reported as absent or lackluster by participants. Specific applications such as *Duolingo* have been praised by subjects for the possibility to practice pronunciation and strategically review vocabulary, aspects reported by Kessler (Kessler, 2021, pp. 6-8, p.12-14).

On the other hand, the disadvantages reported by participants are varied, including technical aspects such as bugs, confusing layouts, annoying notifications and advertisements. The apps are also reported as having translation issues. The content reported by participants is missing key elements and focus on skills such as syntax, grammar, pragmatics and culture. It was also reported as being not applicable to concrete communicative contexts. The vocabulary presented is also considered too basic, and only a fraction of what a language includes, which is why participants used additional material in combination with the application of their choice.
The data presents a clear increase in the use of online dictionaries as technological tools in addition to language learning applications, followed by a high percentage of participants that implemented movies, podcasts, and TV series or similar means. This might be due to the high motivation that movies and TV series bring, with users able to watch content in the source language and using subtitles to understand the content. Learners can motivate themselves through movies and TV series because they can select what to watch, catering to their preferences, such as the case of a participant whose desire was watching anime in Japanese and started watching subtitled content, slowly starting to watch clips without subtitles. *YouTube* video are other tools that saw an increase in use and could be useful for the high presence of language content through tutorials, courses from official linguistical entities (e.g., Cambridge) and the possibility to leave comments and contact a community of fellow learners. Finally, the decrease of use of other applications or technological tools might be directly connected to the number of participants who employed nothing but the application they chose. This might be a sign of demotivation for improving their learning experience or a lack of time, as almost all

participants were either students or employed, in certain cases both. Language learning applications were considered as not enough and not particularly effective, especially in the case of learning a previously unknown foreign language. Even in the case of already known languages, the difficulty presented by language learning applications did not correspond to the users' previous language knowledge, with activities considered too simple and repetitive. Along with the sudden increase in language manuals use during the last week of experimentation, it appears that some participants considered language learning applications as an introduction to the language they decided to study. Thus, in the future, these subjects might not use the apps entirely, learning through a more traditional methodology.

The concept of what additional material was employed by participants also becomes relevant when we observe the progression in skills that were practiced by the subjects during the experimentation period.

Participants focused mainly on skills and content that was provided by their apps without additional material, mainly vocabulary, reading, and listening. The increase in participants focusing on grammar and writing might be indicative of participants adapting their work with the use of additional materials. The decrease in speaking, especially notable during the first three questionnaires, might also be a sign of participants focusing on what skills are presented by apps, rather than what they wanted to focus on. This is reminiscent of a concept called anchoring and adjustment, a cognitive strategy in which learners follow and make minor adjustments to a prefixed lesson plan, despite of its flaws (Roberts; Kreuz, 2016, p. 17).

Another aspect apps were criticized for was their overall focus on memorization and not on inductive language learning.

Furthermore, the repetitiveness perceived in language learning applications and the items provided might have brought a sense of fatigue and demotivation to the participants.

As notable from the overall data, as the experimentation progressed, there was a noticeable decrease in longer timespans spent on the applications, with most participants spending between 5 and 10 minutes daily on their applications. The increase of shorter timespans might be a sign of decreased motivation during the experimentation, or that other reasons (i.e., work or study) might have kept the participants from spending more time on the application. As far as the participants that spent longer timespans are concerned, enjoyment of the app is possible, especially with applications rated positively by the learners such as *Cake* or *Mondly*. In the

context of the experimentation longer timespans, especially at the beginning of the process, might have also given subjects the possibility to notice and point to advantages and disadvantages in the app chosen, helping them decide if the app was worth using further, or switching to another one. Such a case happened with *Memrise*, which was considered by participants to be insistent on placing tests, confusing in its layout, and overall repetitive and unappealing.

One of the objectives of language learning apps is making users spend more time on the app, which might lead to in-app purchases. The presence of paywalls in language learning applications might be discouraging because some users might not afford to pay for subscriptions to the app, potentially hiding useful learning functions and decreasing motivation, desire to keep studying a chosen language and, ultimately, keep using the app. This, along with hindering gamification elements such as lives taken for every mistake, create a sense of anxiety according to the users.

Some of the elements noted in the experimentation are in line with what was found in the literature. Tran's (2020) study found that technology-related factors such as Internet connection quality, app performance, and lack of elements such as personalized feedback are inter-related to factors such as user motivation (Tran, 2020, p. 165). The same problems related to confusing layout and distractions were also noted by Ozer and Kılıç (2018, p.2924) in their study on university EFL (English as a Foreign Language) students. The positive effects on learning experience derived from peer feedback, active communication, and instructor support were also evidenced in Tran's study, a reflection the lack of speaking and active interaction reported in the experimentation (2020, p. 187). The lack of content and focus only on certain elements of a language have also been reported in the literature by Teske's (2017) report on *Duolingo* and are similar to what reported by participants (Teske, 2017, pp.399-400). The excessive focus by *Duolingo* tasks on memorization of content has been reported by Kessler's study (2021) following six university students learning an L2, in a similar manner to what participants reported in the experimentation (Kessler, 2021, p. 14). Other aspects present in the study that are related to the data collected report *Duolingo*'s lack of clear instructions and layout, lack of content (e.g., grammar), and lack of opportunities to use what was learned in direct interaction with other users or in real-life settings (Kessler, 2021, p. 17).

In contrast to what reported by the literature, the presence of gamification elements was both seen by participants as a positive and a negative aspect. Though elements such as scoreboards

and checkpoints were considered positive aspects, useful for engagement, elements such as a lives system on Duolingo were considered a hinderance for learning, in opposition to the increase in learners' motivation and lives as a form of feedback reported by Shortt et al.'s literature review (Huynh et al. 2018, Loewen et al. 2019, as reported by Shortt et al., 2021, p. 21).

4.3 RQ3: What is the didactic potential of MALL?

This paragraph will be dedicated to discussing points taken from the data, suggestions for effective implementation of MALL or language learning applications, and other concepts which might be useful for further study on the topic.

4.3.1 Understanding the learners and their needs

As can be seen in the results to the previous research questions, most of the potential for MALL is related to its accessibility and ease of use. The approach provided by language learning applications in particular can be beneficial for introducing learners to a foreign language and helping them practice and can be a useful tool. Unfortunately, as was evidenced in research question two, this approach has some noticeable disadvantages that can render practice with apps boring, repetitive, and inferior to a traditional language course. Furthermore, another aspect noted by subjects is how sterile and somewhat anonymous the experience of learning a foreign language through apps can be, despite the presence of tools such as forums and chats to speak with other learners. Participants were also clear about what they wanted from language learning applications: more focus on content such as grammar (e.g., through handouts or flashcards), skills such as pragmatics, writing, or speaking, dialogues to practice or listen to. Other aspects mentioned were readings from newspapers or literary sources, the possibility to discover the culture of a given language, an in-app dictionary, and the possibility of applying language transfer through analogies between L1 and L2/FL to facilitate learning. Most of all, participants expressed the desire to build an active use of language, something that participants could use practically in their everyday lives.

Yet, in answering this research question, it is worth considering other aspects that can render the process of using a language learning application more interactive and motivating, while also being more valid from a linguistic standpoint. The reasons for not implementing specific

elements are varied and take into consideration aspects such as monetization of content and in-app purchases, development not done in collaboration with language certification entities, or an approach similar to gentrification in which a main, dominant model (e.g., *Duolingo*) influences the design of other applications, independent of its validity or lack thereof.

The concept of MALL might benefit from understanding learners' needs and desires, but also their interests. This might make for a more personalized learning experience and is already a part of apps such as *Mondly*. A step beyond that could be understanding the users' learning styles before engagement with the application. As said in chapter 1, understanding the characteristics of learner profiles and how to adapt learning to each profile is crucial to higher engagement with language and increased motivation (cf. Tran, 2020). Learner profiling might be done along with language level tests. Testing pre-existing knowledge is frequently done in language learning applications such as *Duolingo*, *Mondly* or *Babbel*, although it could be accompanied by the possibility to skip already consolidated content once level placement has been tested. A brief learner profiling questionnaire would serve multiple purposes, giving learning on the application a semblance of personalization. This could be done through a personality test asking question related to motivation, previous use of language learning applications or objectives learners want to achieve, as can be seen in Table 15.

What do you usually do when you do not understand something?	What teaching method do you prefer?	You have to take notes and schematize during a lesson. What do you do?
• I give up and move to something else (Taster). • I try to find a personalized way to study the topic (Player). • I try to understand if the topic is important and give my best to understand. Otherwise, I might move to something else (Steady). • I ask others for help and try to find a way to understand it (Hard worker). • I never give up and continue studying until I understand everything (Perfectionist).	• Teaching a bit of everything, giving an introduction to various topics (Taster) • Teaching with various activities and tools, making sure the lessons are not boring, while still teaching something (Player) • Working with important topics for different environments following a set scheduling. (Steady) • Focusing on single topics until they are well understood. (Hard Worker) • Teaching everything in detail (Perfectionist)	• I write only what I think are the keywords. I take note of anything else if I believe it to be fundamental. (Taster) • I make drawings, play on words, use colors and highlighters. (Player) • I make an organized chart and report lesson content by dividing into categories. (Steady) • I paraphrase what the teacher says, writing most of the lesson. (Hard Worker) • I take note of every word the teacher says and record the lesson with my phone. (Perfectionist)

Table 15: Examples of questions for learner profiling in an ideal language learning application

In the app marketplace, a considerable number of apps and tools targeted at new language learners assumes they are also young learners, so engaging both young and adult learners can amplify the user spectrum. Finally, developing communication with native speakers more effectively can help develop active language learning. Communication can be fostered by connecting social media apps, visual scaffolds, on-screen templates guiding learners through conversation starters and scripted dialogues, or face to face exchanges via video. The possibility to switch easily between different digital environments would also be welcomed, as apps that can also be flexibly used on desktop are rare in a market dominated by apps designed entirely for use on mobile devices (Van der Poorten-Sawyer, 2020, pp. 200-205).

Including learners of a higher proficiency as well is another aspect previously mentioned in order to keep motivation and interest high, taking into account that instructional design is much more important and useful for learning communicative competence in a target language (Stockwell, 2022, p.59); considering various kinds of engagement can be beneficial for language learning, as showed in Table 2:

COGNITIVE ENGAGEMENT	The mental effort or sustained attention in completing a task
BEHAVIORAL ENGAGEMENT	The amount of actual time spent completing a task
EMOTIONAL ENGAGEMENT	It includes the degree of enthusiasm, interest, and enjoyment related to sustaining the time spent on a task
SOCIAL ENGAGEMENT	Focuses on the collaboration between learners

Table 16: Kinds of engagement that might be beneficial for language learning (adapted from Stockwell, 2022, p. 137).

Sustained engagement on all levels, as seen in Table 16, might help the learners create new learning habits. With MALL technologies it might be more difficult, since there is a tendency

for learners to drop interest in a technological tool after an initial period of high motivation in use, unless they see a link between their linguistic goals and technological tools. This link may be easily made by learners who are already autonomous, so training students' autonomy is another step towards bettering learning through MALL (Stockwell, 2022, pp. 139).

Implementing and promoting forums or community chats can also help learners integrate with a community of fellow users, cooperating on reaching similar objectives and motivating each other. It might also be helpful for suggesting additional material such as *YouTube* videos, TV series or language manuals and organizing written and oral group chats on services such as *Discord* or social media. Mobile learning can extend the times and places potentially available for learning, engaging peer support for some technical problem solving, and has the capability to align people's positive experiences of technology use for pleasure to allow for new thinking and practices. MALL technologies may allow learners who feel excluded by traditional education to be included and find useful resources in an environment characterized by ease of use, speed of use, and a constant flow of information. The opportunity to keep in touch with other learners frequently might help language learning, building and emphasizing reflection on the notions taught. Favorable learning experiences can also include the usage of different applications and devices according to learner preferences and students' affective responses to learning experiences, leading to a variety of learning combinations and possibilities through activities such as storytelling, extensive reading, collaboration and reflection. These activities can be an important learning step, as they are embedded in social networks and systems of peer support (Kukulska-Hulme, 2021, pp. 126-129). Usage of diary style e-journal is another idea for keeping track of progress and sharing with other learners in an active and supporting community. Diaries have the potential to be ''applied metacognition'' and build awareness of one's own learning, add functionality and help learners become more aware of the distinct challenges they can face during the learning process (Kessler, 2021, pp.19-20).

4.3.2 Teacher and learner training

The perspective of teachers can also be useful and appreciated. Applications such as *Babbel* and *Memrise* already offer content creation tools which might be beneficial for learning in a traditional learning environment, but applications may also benefit from direct interaction with teachers, testing the possibilities of MALL with learners and understanding what works and what needs alterations. In order to do such a process, teachers need to be aware of how mobile devices and apps can improve their language teaching and the language learning of their students. To achieve this, breakthroughs in MALL should be aptly communicated especially in mainstream and generalist communication channels such as blogs, social networks, video platforms. The teachers also need proper tools in order to discern what is a legitimate help for language learning and teaching, and what is not (García et al., 2021, pp.82-83). This step might direct teachers towards recommending optimal learning tools for their classes and adapt teaching to different learning environments. Teachers may achieve this through experiencing MALL or CALL as learners themselves, sharing learning models and how to select activities with other teachers, cyclical training, collaborative debriefings with and for students, and teaching learning strategies that go beyond the use of MALL technologies (Stockwell, 2022, p. 135). Giving options for teacher to connect the apps to their teaching materials could also promote creativity in the classroom and test the didactic capabilities of the app and its content (Van der Poorten-Sawyer, 2020, pp. 200-205).

Student input on MALL should also be embraced, especially if the students are already familiar with the technology proposed.

Facilitating conditions for MALL implementation should also be considered, such as stable Wi-Fi connections, updated devices and giving teachers the opportunity to follow training sessions and familiarize with the technology they might employ (García et al., 2021, pp. 82-83). It would also be beneficial to consider criteria for selection of MALL tools, such as price and the fact that learners might tend to choose tools which focus on the most evident aspects of language learning, usually vocabulary, instead of listening or pronunciation. This happens either because learners are not aware of what is needed to develop skills in a target language, or because vocabulary is a skill which is not difficult to study and in which progress is most noticeable (Stockwell, 2022, pp.59-60). Helping learners find clear criteria for selection of tools is, therefore, an important step in MALL and language learning application approaches. Students

also need to be guided in the discovery of new strategies to suit personal learning preferences: suggestions during app usage or more diverse activities can foster a learners' developing awareness of learning (Van der Poorten-Sawyer, 2020, pp. 200-205).

Proper training for teachers and learners on MALL technologies and focus on digital literacies should specifically focus on (Stockwell, 2022, pp. 57):

INFORMATION LITERACY	The ability to seek and organize information
MULTIMODAL LITERACY	The ability to deal with information that comes through multiple modes
MEDIA LITERACY	The ability to evaluate the credibility of sources and to create new messages based on the information taken from these sources

Table 17: Kinds of literacy to focus on for language learning stakeholders' training.

Other issues found as barriers to transformational change include (Kukulska-Hulme, 2021, p.130):

> ''Key stakeholders (e.g., declining teacher engagement and motivation), curriculum (e.g., lack of curriculum flexibility, slow identification of new trends and issues), communication (e.g., lack of bottom-up communication between students and teachers), process (e.g., inefficient processes to introduce change), and cultural heritage (e.g., resistance to change, attitudes towards lifelong learning, a testing and Key Performance Indicators-based system creating a cultural mindset of their value).''

Overall, there are ideas on how to construct both teacher and learner training on using MALL in a traditional learning setting, as shown by constructs such as Hubbard's model of training in MALL (2022, pp. 141-144):

TECHNICAL TRAINING	This step involves familiarizing learners with the tool used (e.g., introducing and explaining how an app works)
STRATEGIC TRAINING	e.g., using an app for planning learning strategies, scaffolding, or apps to improve listening and speaking
PEDAGOGICAL TRAINING	Learners evaluate and teach others the strategies learned (e.g., teaching how to use an app and why it should be used, teaching the pedagogy behind a didactic approach)

Table 18: Hubbard's model of training in MALL

The steps presented in Table 18 are considered as a model to help learners familiarize with technology in an ongoing and cyclical manner. Learners and teachers discuss technology usage and learning strategies in debriefing sessions. Training needs to be integrated as part of a course,

with consistency and planning. Of course, each model needs to be adapted and consider the variables in different learning environments, such as users' knowledge of technology, availability of dedicated time and spaces, and having the tools necessary.

4.3.3 Strategies for more effective MALL use

The focus and goals of dedicated language learning apps should be to enable learners to become globally connected citizens in, for example, English as a second language, which could give learners plenty of opportunities to be exposed to language in use and thus allow them to recollect language incidentally. An investment in pedagogy research is also considered as a necessity for language learning apps' development, as designers most often don't know much about pedagogical theories. Many apps also focus more on keeping the user's attention instead of providing actual didactic content. This is done in order to expand time on the app and potentially lead to in-app purchases. Apps should also consider users' past experiences as learners, rather than focus on repetition of the same recurrent patterns (Almousawi, 2021, pp. 177-178). On this note, it could be useful to consider elements such as the flow and progression of activities presented in the product, and at what point learners begin to feel tasks are becoming overly repetitive (Kessler, 2021, p.20). This can be done by encouraging users to give feedback on aspects of app design which feel demotivating.

Other ideas that might be applied to better language learning application development are applied to Professional Development (PD), defined as (Villegas-Reimers, 2003, as quoted in Tran, 2020, p. 7):

> ''The development of a person in his or her professional role.''

Here are some strategies and conditions proposed to facilitate self-directed MALL for PD (Tran, 2020, pp. 175-184).

Bite-sized Learning	Small chunks of content, to be completed between 3 to 10 minutes, preferably whenever dead time is available; this strategy is appealing to busy learners and for committed learners, helping them accumulate learning and sustain engagement thanks to the flexibility and convenience provided
Interaction with Peers and Instructor	Crucial in problem solving, providing feedback and guidance for correcting mistakes; effective instructional strategies and ongoing technical support lead to effective MALL experiences. Modeling and coaching from peers can also contribute to self-efficacy, although the learners need to be seen as individuals with different behaviors and engagement patters. Employing general measures as well as specific strategies for each learners can be more suitable.
Clear, succinct, open-ended instructions	Instructions need to be clear, simple, step by step and brief in order to work best. They also need to be open-ended in case learners want to explore further by themselves.
Technical aspects	A stable Internet access, big screens, security, and devices capable of having enough memory and interactivity. They must also be compatible with most mobile applications.
Embedding technologies in appropriate learning designs	Giving units and topics in the application the structure of a learning unit in a language manual, with vocabulary, grammar, communicative functions and more, focusing on Freddi's (1994) Learning Unit structure: - Motivation (introducing learners to the content in an engaging manner) - Globality (knowing what the content is) - Analysis (understanding the content through activities) - Synthesis (actual language production)
Flexibility, convenience, standards and compatibility	Apps should potentially be usable on different devices, affordable, and consider different learning styles and needs.
Enjoyment	Perceived playfulness, fun and enjoyment are a part of motivation; enjoyment is a catalyst to stimulate the learning process; enjoyment can be used to encourage enjoyable and sustainable learning practices.

Table 19: Strategies and conditions to facilitate MALL in Professional Development

The point about appropriate learning design in Table 19 is notable for the inclusion of skills and content lacking in language learning applications.

4.3.4 Suggestions for inclusion of other language skills in language learning applications

A point often repeated in the literature and by participants in the experimentation was the absence of activities related to skills such as grammar and the lack of content that provided real-life language and exposure to the culture. When looking at the results of the questionnaires, it appears that vocabulary is the main aspect that language learning applications focus on, albeit in a seemingly repetitive and basic way, as reported by subjects. The vocabulary proposed rarely advances in applications like *Duolingo*, so the focus might be on advancing vocabulary further, for example by dividing content into levels, e.g., by using the Common European Framework or Reference as a basis.

The main method used by applications such as *Duolingo* or *Memrise*, that of associating a word to its translation, appears to be mostly based on rote memorization, and most apps appear to be using memorization as the main method for learning vocabulary. The learning of words should not be the primary focus of language learning. For example, most languages employ idiomatic expressions which only have an arbitrary relationship between the literal meaning of the word and what it actually means. Thus, the learners' effort should be to combine the terms known to communicate effectively (Roberts, Kreuz, 2016, p. 105). The concept of transfer can be helpful in conveying theoretical concepts into concrete language production, especially if the language is acquired in sterile ways such as listening to prerecorded lessons, flashcards, or practice drills through apps. Transfer has different variations (Roberts, Kreuz, 2016, pp. 106-107):

POSITIVE TRANSFER	e.g., noticing similarities in cognates
NEGATIVE TRANSFER	The learning interferes with acquiring new material (e.g., erroneously using the word order from your native language into the target language; the most common example of negative transfer is false friends)
LOW-ROAD TRANSFER	It happens when well-established rehearsed material is automatically applied to a new context; it emphasizes outcome over process, for example in scripted activities.
HIGH-ROAD TRANSFER	It is mindful and relies on metacognitive abilities to consider how new material can apply to previously acquired knowledge and

	new communication situations. High-road transfer also involves actively looking for patterns and connections in the material and allows flexibility in language use.

Table 20: Variations of linguistic transfer

As notable from Table 20, the process of transferring knowledge to and from the native language of the user can help learning by associating with already established content. Working inductively from the native language and let the learners reach conclusions on their own might also be an effective way to facilitate learning. Other elements that may foster vocabulary learning are the use of definitions, presenting elements that usually accompany a word (i.e., collocations), or antonyms (i.e., opposites of a word), with accompanying examples (Taebenu, Katemba, 2021, pp. 231-232).

Another aspect that might help learners retain content is promoting and suggesting learning strategies. This can be done in a dedicated area of the app, through tips before activities (in a way similar to control reminders or tutorials in videogames) and for different skills. In the case of vocabulary, for example, promoting learning strategies should follow three steps: teaching to find the meaning of unknown words, how to retain them in long-term memory, and finally how to use them for writing or speaking. Thus, after a given activity on vocabulary, apps might promote learning strategies for retaining meaning and promote activities on speaking (i.e., dialogue production or listening to dialogues) and writing (i.e., creating examples or writing a text) using the vocabulary given (Catalán, 2003, as quoted in Gonzáles-Valencia et al., 2020, p. 263). An example of this might be tips on elaborative rehearsal strategies, focusing on meaning: paraphrasing, recommending learners to think about how the word connects to other words in their vocabulary, or thinking about how the word relates to themselves (Roberts, Kreuz, 2016, pp. 124-125). These are strategies that might help learners process information at a deeper level, transferring information into long-term memory in a meaningful and lasting manner. The concept of encoding specificity is another that might be useful, learning the language in a way that might mimic how the content will eventually be used (Roberts, Kreuz, 2016, pp. 154-155). This is very adaptable for MALL and especially language learning applications since they can be used almost anywhere. The possibility of learning vocabulary, grammar, and communicative functions in a learning unit related to a restaurant for instance, whilst dining, might be very effective for language learners. The content might be linked to the experience, strengthening learning.

4.3.5 Further elements to consider

Overall, when it comes to effective application design it would be optimal to consider all the variables of the learning environment, and an example of this is Kukulska-Hulme's (2012) framework for next generation designs:

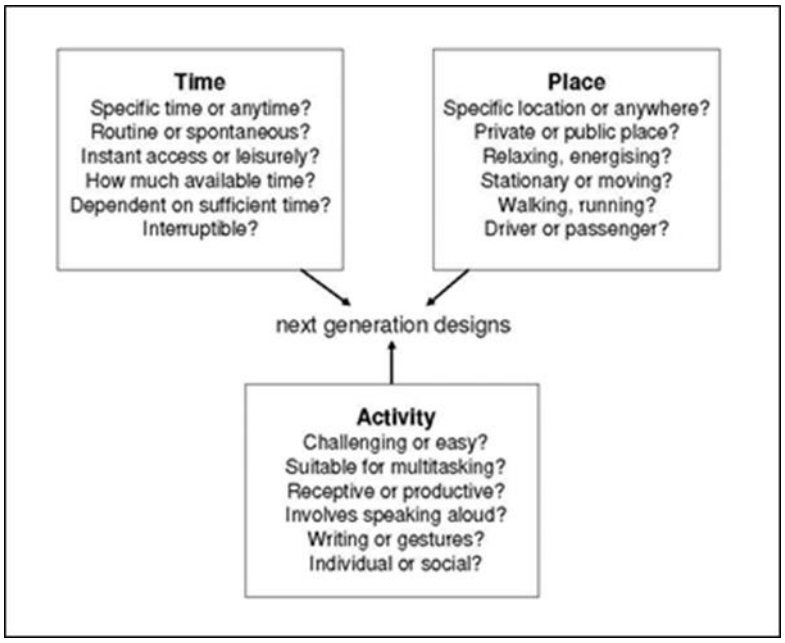

Figure 10: Conceptual framework for next generation designs for mobile supported language learning. (Kukulska-Hulme, 2012, p.14, as reported in Van der Poorten-Sawyer, 2020, p. 43)

As notable in figure 10, time and space are central elements, but they work in conjunction with the concept of activity. Learners determine their own boundaries and arrive at subjective decisions to judge the value of the resources given for the activities, where they want to use them and when, deepening understanding of how the tools are being used and how users can employ MALL technologies based on their needs and possibilities (Van der Poorten-Sawyer, pp. 42-43).

Finally, one of the most important aspects to remember in designing and selecting language learning apps, should be helping learners in their process of creating a linguistic competency that takes into account their relationship with the target language, the culture that surrounds it, and their native language (Roberts, Kreuz, 2016, p.70). The objective of the process should be helping learners to express themselves as best they can, while also considering their linguistic starting point to help guiding and facilitating their learning. Language learning takes into

consideration a learner's strengths, weaknesses, needs and previous knowledge, something that apps can potentially implement for a more varied, complete, motivating, and overall useful experience.

CONCLUSION

Today, MALL is an approach that could have vast potential, but is often misunderstood or is poorly implemented, with a lot of confusion surrounding it, and a lack of guidance for teachers and learners alike.

This thesis was intended to provide an overview of the complexity surrounding the topic of MALL and specifically language learning applications, and this overview encapsulates a specific moment in time, that in which this study has been done and written. The results of this study showed that while language learning applications were enjoyed by participants and are considered a welcomed break from traditional language learning, apps still have a lot of disadvantages, being lacking both in teaching content and teaching useful linguistic skills. Overall, this reflects what was found in the literature on the topic. Because of the everchanging context of technology, what is said and discussed about a specific application and its validity might not be valid in the future, even in short time. An example of this is *Tandem*, an application that allowed users to chat with multiple chat partners at once, teaching and practicing languages in pairs. According to participants in the experimentation, the app recently switched to a one-partner-only model with longer waiting times, rendering more difficult to use and more demotivating for those that want a quicker, more practical way to learn content in a foreign language.

The study allowed to discover that the overall experience for language learning application use can be motivating and engaging, especially at the beginning of the learning process, but the lack of useful elements and strategies necessary for language learning can quickly render it demotivating. Among the advantages found in MALL learning it is worth mentioning ease of use, intuitiveness, gamification elements that render learning more fun, and the possibility to practice vocabulary and pronunciation; the disadvantages, meanwhile, include a lack of speaking and writing activities, repetitiveness, close to no content on grammar, and the absence of contact with the culture of a chosen language and other learners. Finally, the didactic potential of MALL was analyzed, with the possibility for users to learn anytime and anywhere and interactively catering learning to specific contents and needs. Among the proposals made for better MALL implementation, especially concerning language learning applications, the following were mentioned:

- Learner profiling
- Proposing different activities for different language levels following the CEFR
- Implementing or promoting the use of forums and group chats for communicating with other learners and as a form of support
- MALL training for teachers and students
- Promotion of learning strategies both in-app and outside the app
- Transfer of content from other languages known/the user's native language

This study had its limits and was not representative of the entirety of the spectrum of opinions on MALL and language learning applications, nor of the endless technological content and tools on the market. With a limited sample size and a focus on a specific selection of language learning applications, further research is definitely needed, especially considering the constant technological shifts that characterize MALL. The author of this study hopes that this thesis has still managed to contribute to the overall research on the topic, which has quite the potential.

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APPENDICES

APPENDIX A: INTRODUCTORY QUESTIONNAIRE

SECTION 1

How old are you?

a. 18-21
b. 22-24
c. 25-27
d. 28-30
e. Other

What is your current occupation?

a. Studying
b. Working
c. Other

Could you specify what you are studying or doing for work?

1. Do you use foreign languages in your study/work field? (1= always; 2 = often; 3 = sometimes; 4 = rarely; 5 = never)
2. How would you rank your English language level or the level of the foreign language you use more?
    a. A1 (low level)
    b. A2 (low-intermediate level)
    c. B1 (intermediate level; with a B1 the threshold for effectively communicating abroad is reached)
    d. B2 (intermediate-high; a B2 level certifies people with a great knowledge of the language)
    e. C1 (high level; with a C1 level you are an expert in this language)
    f. C2 (very high level; native speaker level)
3. Have you ever used application on smartphone, tablet, or computer to learn English or other foreign languages?
    a. Yes
    b. No

SECTION 2

4. Which of the following applications did you use?
    a. *Duolingo*
    b. *Babbel*
    c. *Memrise*
    d. *Rosetta Stone*
    e. *Busuu*
    f. *Tandem*
    g. *Drop*
    h. *Mondly*
    i. *Speakly*
    j. *Cake*
    k. *Pimsleur*
    l. *Beelinguapp*
    m. Other
5. Why did you use on or more of these apps to learn English/other foreign languages?
    a. Curiosity towards the app
    b. Somebody recommended it to me.
    c. I felt the need to learn/get better at that language for study/work reasons.
    d. I wanted to learn/get better at that language for personal motivations.
    e. Other
6. What languages did you try to learn with these applications?
7. Many of these applications allow for set study sessions, usually between 5 and 15 minutes long. Do you remember having set time limits for your study sessions?
8. Do you use/Did you use these apps daily, or with gaps between each session?
9. Do you like/ Did you like using these applications?
    a. Yes
    b. No

SECTION 3: POSITIVE answer to question 9

10. (A) What did you like about these applications?
11. (A) Do/Did you think they are/were motivating and effective for language learning?

SECTION 4: NEGATIVE answer to question 9

10. (B) What did you dislike about these applications?

11. (B) Why do/did you think they are not motivating and effective for language learning?

SECTION 5

12. What do you think could be improved about the applications you use/have used?

SECTION 6

Do you have other comments or suggestions which might be useful for this questionnaire?

APPENDIX B: MONITORING QUESTIONNAIRE

1. What application did you choose?
2. How long have you been using the app you chose?
    a. 1 day
    b. 2 days
    c. 3 days
    d. More than 3 days (specify in "Other")
    e. Other
3. Are you still using the app you chose?
    a. Yes
    b. No, I have stopped using it.
4. What devices are you mainly using to learn with this app?
    a. Computer
    b. Smartphone
    c. Tablet
    d. Other
5. Did you implement other technologies/methodologies in conjunction with the app you chose?
    a. Online dictionaries
    b. Movies, Podcasts, TV series, etc.
    c. YouTube videos
    d. Language Manuals
    e. *YouTube* videos
    f. Other apps
    g. Other online resources
6. How much time do you spend daily on the app you chose?
    a. Less than 4 minutes
    b. 5-10 minutes
    c. 11-15 minutes
    d. 16-20 minutes
    e. 21-30 minutes
    f. More than 30 minutes
    g. Other

7. What do you like about the app you chose?
8. What do you dislike about the app you chose?
9. What language(s) are you learning?
10. What are you focusing your work on?
    a. Vocabulary
    b. Grammar
    c. Writing
    d. Speaking
    e. Reading
    f. Listening
    g. Pronunciation
    h. Other
11. Did you switch to another app or try new apps in the past few days?
12. In case you stopped using the app you selected, why did you do so?
13. Are there any aspects you would like to work on that are lacking in the app(s) you use/used?

APPENDIX C: FINAL QUESTIONNAIRE

1. What foreign language(s) did you know before the experimentation period?
2. What language(s) did you study during the experimentation? Think of the entire three-week period (e.g., I started with Spanish and switched to Swedish).
3. Why did you choose that language/those languages?
4. Did you focus on a language you did not know, or did you decide to reinforce a language you had already studied?
5. Do you believe to have learned something more about the foreign language(s) you chose? What?
6. Did your opinion on language learning applications change after the experimentation period? If so, how did it change?
7. Did you use the same application for the entire experimentation period?
   a. Yes, I used the same application for the entire experimentation period.
   b. No, I switched to other apps (specify in "Other")
   c. Other
8. Would you recommend the app(s) you used during the experimentation period to other learners? Why?

APPENDIX D: NOTABLE SUBJECTS' COMMENTS (ITALIAN)

Non molto, erano sempre le stesse e un po'mi annoiavo. (S.1)

Per allenare una lingua conosciuta sì, ma non mi sembrano efficaci per imparare una nuova lingua da zero. (S.2)

Danno la forte impressione di essere progettate per turisti, con argomenti da turisti e vocabolario da turisti, che annoia in fretta il resto degli users. (S.3)

Punterei a una risorsa unica che coniughi tutti gli aspetti di una lingua e di una cultura che possono essere appresi, includendo più target e livelli a cui si vuole arrivare. Esistono siti e applicazioni per approfondire tutti questi aspetti, ma diventa complesso ricercarli uno per uno, creando un'applicazione o sito unici è più semplice che lə utilizzatorə si orientino e che anche chi non ha risorse tecnologiche particolarmente recenti possa utilizzarli (avere più applicazioni in uno smartphone non è scontato se quello smartphone è datato e ha poca memoria, ad esempio). (S.4)

Ho usato Babbel il primo giorno e gli altri due giorni Duolingo (S.5)

Si, ho provato anche Rosetta Stone e Duolingo (S.6)

Inizialmente avevo scelto Cake, ma l'ho dopo 10 minuti l'ho disinstallata perché per me era difficile capire il funzionamento (S.7)

Di memrise non ho notato differenze dalle volte scorse, mondly mi piace molto perché ha una suddivisione più ordinata e schematica delle unità, quasi come se fosse un libro, insiste molto sull'attivazione di più zone neuronali (infatti quando si apprende qualcosa poi viene mostrata un'immagine del cervello in cui si illuminano le zone attivate). Mondly insiste di più sul completamento che sulla scelta di più opzioni (anziché scelta multipla predilige la digitazione a tastiera). Inoltre, l'apprendimento di mondly è più personalizzato perché chiede i campi di interesse. (S.8)

[talking about Cake] Tutto! Amore a prima vista: il fatto che sia come imparare l'inglese guardando un film con i sottotitoli, ma con il plus della possibilità di esercitarsi e comprendere battuta per battuta quello che si dicono gli attori. (S.9)

Mi piace anche la possibilità di lavorare su un singolo verbo e gli usi che se ne possono fare: questo attraverso una spiegazione molto chiara e poi una serie di esercizi. Mi piace perché è divertente e molto ben fatta in ogni cosa, per quello che ho avuto modo di provare oggi. Mi piace anche che il livello sia alto già dall'inizio, per me che l'inglese lo parlo abbastanza ma non con sicurezza. Questa applicazione mi sembra quella perfetta per raggiungere quella sicurezza nella lingua quotidiana parlata che al momento mi manca. (S.10)

Ormai più nulla. (S.11)

Mi hanno consigliato Cake, che proverò a breve. (S.12)

Ho aggiunto Mondly. (S.13)

Cultura, possibile utilizzo in caso di viaggio in Giappone. (S14)

Amo la sonorità della lingua, la cultura e la letteratura francofone. Le città francesi. Poi lo avevo già studiato alle scuole medie e volevo migliorarlo. (S.15)

Perché ho sempre voluto impararlo e perché mi piacerebbe vivere in Germania. (S.16)

Perché l'inglese è alla base della comunicazione mondiale. Per lavoro lo uso quasi giornalmente. In più mi piacerebbe sfruttarlo per fare nuove conoscenze. (S.17)

Per meglio affrontare i colloqui. (S.18)

Il francese per rispolverarlo dalle medie e in vista di un possibile bisogno di conoscere la lingua per la futura magistrale, poi l'inglese per la volontà di alzare il mio livello in questa lingua. (S.19)

Meh, le app sono sicuramente un modo utile per potenziare, ma penso che alla fine nulla possa soppiantare un corso tenuto da un [parlante] madrelingua. Una app difetta (almeno al momento) della capacità' di fornire una certa "personalizzazione" alle lezioni. (Esistono concetti di IA su Duolingo che vorrebbero andare a fare ciò, ma sono ancora embrionali). (S.20)

[…] Duolingo non è sufficiente per apprendere la lingua e farne un uso quotidiano, ma altre applicazioni (e.g. Babbel) mi hanno incuriosito perché sembrano insegnare frasi e concetti più utili nella vita quotidiana. Non ho approfondito e mi sono assestato su Duolingo perché altre app richiedevano un abbonamento che non potevo pagare, ed inoltre Duolingo era compensata dal corso del CLA. (S.1)

[…] Se [gli utenti] hanno poco tempo è' comoda, se tempo ne hanno e possono seguire per esempio delle lezioni, resta comoda comunque come potenziamento personale (anche se probabilmente non necessario). (S.2)