App Attrition in Computer-Assisted Language Learning: Focus on Duolingo

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Abstract

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Language learning apps (LLAs) are computer programs that offer individualized, usually self-directed, and accessible (free or low-cost) language instruction. Studies suggest that the pedagogical affordances of LLAs can enhance the learning experience in many ways (Chukharev-Hudilainen & Klepikova, 2016; Fiori, 2005; Liakin, Cardoso & Liakina, 2015). However, there are many challenges that computer-/mobile-assisted language learning (C/MALL) bring to the learning environment, resulting in high levels of user dropout from using LLAs (Garcia-Botero & Questier, 2016; Nielson, 2011). We propose the term 'app attrition' to describe this process, whereby language learners abandon an app due to a series of internal and external factors. The current study aims to identify these factors and to examine how they affect users' perceptions in a C/MALL setting, building on data collected from users of the language learning app 'Duolingo', one of the most popular LLAs currently available.

Using questionnaires (Likert-scale items and open-ended questions), we surveyed 79 Turkish (L1) Duolingo users learning English as a Foreign Language in Turkey on many factors that have been reported to contribute to app attrition: reduced motivation, social isolation, anxiety, lack of success, inability to regulate learning, lack of guidance, inauthenticity of content, poor instructional quality, and technical issues. In addition, our study included interviews with a small number of participants for an in-depth investigation of users' behavior. From social constructivist and connectivist perspectives, we discuss the pedagogical implications of our findings by highlighting ways of mitigating the effects of app attrition in self-directed language learning - an important challenge that, to our knowledge, has not been comprehensively examined in the literature.

Résumé

Attrition des Applications Mobiles dans L'apprentissage des Langues Assisté par Ordinateur : Étude Centrée sur Duolingo

Haluk Olcay Tuncay

Les applications mobiles pour l'apprentissage des langues sont des logiciels informatiques qui offrent des cours de langue personnalisés, généralement autonomes et accessibles (gratuit ou peu coûteux). Des études suggèrent que les possibilités pédagogiques offertes par ces applications mobiles peuvent améliorer l'expérience d'apprentissage de plusieurs manières (Chukharev-Hudilainen et Klepikova, 2016 ; Fiori, 2005 ; Liakin, Cardoso et Liakina, 2015). Cependant, l'apprentissage des langues assisté par ordinateur (ALAO; CALL en anglais) et l'apprentissage des langues assisté par mobile, autrement appelé Apprentissage des Langues Assisté par terminaux ou appareils mobiles (ALAM; MALL en anglais) soulèvent de nombreux défis dans l'environnement d'apprentissage, ce qui entraîne des niveaux élevés d'abandon parmi les utilisateurs de ces applications (Garcia-Botero et Questier, 2016 ; Nielson, 2011). Nous proposons le terme « attrition des applications mobiles » pour décrire ce processus, pendant lequel les apprenants d'une langue abandonnent une application en raison d'un ensemble de facteurs internes et externes. La présente étude vise à identifier ces facteurs et à examiner comment ils affectent les perceptions des utilisateurs dans le contexte de ALAO / ALAM, tout en reposant sur les données collectées auprès des utilisateurs de « Duolingo », l'une des plus populaires applications mobiles actuellement disponibles pour l'apprentissage de langues.

Nous avons interrogé, à l'aide de questionnaires (y compris des éléments sur une échelle Likert et des questions ouvertes), 79 utilisateurs de Duolingo turcs (L1) apprenant l'anglais comme langue étrangère en Turquie, sur de nombreux facteurs qui auraient contribué à

l'attrition des applications : baisse de motivation, isolement social, anxiété, manque de réussite, impossibilité de réguler le processus d'apprentissage, manque d'orientation / étayage d'un enseignant, manque d'authenticité de contenus, qualité de l'enseignement et problèmes techniques. De plus, notre étude comprenait des entrevues avec un petit nombre de participants pour une enquête approfondie sur les comportements des utilisateurs. Notre discussion abordera les conséquences pédagogiques de nos résultats d'un point de vue socioconstructiviste et connectiviste, tout en mettant en évidence les moyens d'atténuer les effets de l'attrition des applications dans l'apprentissage autonome des langues, ce qui est un défi important qui, à notre connaissance, n'a pas été examiné de manière approfondie dans la littérature.

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I would like to express my heart-felt appreciation to both of my co-supervisors, Dr. Mela Sarkar and Dr. Walcir Cardoso; without their immense help and contributions, I would not have been able to conduct research in this field and pursue my goals. I am not only grateful that they shaped and guided this endeavor in the right direction but also grateful that they made it possible, in the first place. I would also like to thank Dr. Teresa Hernandez Gonzalez for her feedback and suggestions on the earlier version of this thesis.

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Chapter One

Living in an age of technology abundance and accessibility, we are carrying more powerful devices in our pockets each year. There is an app for everything: calculating, taking notes, unlocking cars, paying for groceries, reading news, rolling dice and many other things. Although the extent of the benefits from these new apps are still questioned and quite controversial, many people have long adapted to their mobile-assisted lifestyle, surrounded with colorful screens at home, at work, at school, on the bus: anytime and anywhere.

The field of second language education has also been riding the wave of this new trend. As of today, over three hundred million learners have subscribed to a language learning app called Duolingo, which is one of many such apps available (https://tinyurl.com/ybfpjv6l). Using social media, users of these apps not only study a new language, but also explore L2 content, connect with native speakers and peer learners, and practice what they study online whenever they desire with only a few clicks or taps. However, despite the ease of access and many rewards to be gained in this environment, there seems to be a problem no app or technology has yet been able to overcome: the high rates of attrition (Garcia-Botero & Questier, 2016; Nielson, 2011). To our knowledge, no study has specifically investigated the causes of the high attrition rates in computer-/mobile-assisted language learning (C/MALL). In this thesis, we coin the term 'app attrition' and define the underlying process that leads to learners' decision to abandon a language app.

Our study investigates the factors that cause app attrition in computer assisted language learning, with a focus on a specific language learning app (LLA): Duolingo, an app that allows language learners to study a language in many ways: e.g., in a self-regulated manner (practicing with the app and interacting with an online network of peers or local learners), in social isolation

(where they only view the content and do the drills available in the app), or as a complement to the classroom (whereby a teacher or another language program guides or assists the learner).

In the study, we approach app attrition in Duolingo from the perspective of certain key theories, namely behaviorism (Skinner, 1976), social constructivism (Vygotsky, 1978) and connectivism (Downes, 2010; Siemes, 2005) given that learning in Duolingo occurs through translations, social interactions and/or online peer-to-peer interactions. As will be detailed in Chapter 2, we identify nine major factors, building on the literature regarding LLAs and attrition, as shown in Table 1:

Table 1

Factors investigated and how they are operationalized in the study

	Factor	**Operationalized as users' perceptions on…**
1	Poor instructional quality	*Instruction, method and features of the app*
2	Limited learner control	*Customizability and control over content*
3	Learner anxiety	*Anxiety and stress caused by activities in the app*
4	Reduced motivation	*Self-motivation and how the app motivates learners*
5	Social isolation	*Communicative opportunities and social features*
6	Lack of success	*Successfulness in the activities/drills in the app*
7	Lack of guidance	*Guidance or supervision provided by the app*
8	Inauthenticity	*Automatized written and oral content in the app*
9	Technical issues	*Stability of the app (e.g., bugs, freezes, crashes)*

The study aims to lay a foundation for both future research and app development by conducting and analyzing data from a comprehensive survey involving 79 participants, as well as in-depth interviews with eight of these participants. Our study is non-experimental and adopts a mixed-methods approach in which we gathered quantitative data from the survey on

the factors that contribute to app attrition and triangulated the analysis with qualitative interviews. The latter is important because the survey alone cannot account for individual learners' perceptions and motivational patterns when they quit an app. Survey data collection was handled remotely by using Google Forms (survey) and Skype (interview) with Turkish participants residing in Turkey and learning English as a foreign language.

The remainder of this chapter offers an introduction to computer- and mobile-assisted language learning, Duolingo and the concept of app attrition.

Computer- and Mobile-Assisted Language Learning

Computer-assisted language learning (CALL) is "the search for and study of applications of the computer in language teaching and learning", as described by Levy (1997, p. 1). Although it is commonly known as CALL, it is also referred to as Computer-Aided Instruction (CAI) or Computer-Assisted Language Instruction (CALI). Mobile-assisted language learning is a sub-branch of CALL, which has become more popular with the increased use of smartphones and language apps designed for handheld devices.

Studies indicate that CALL can enhance language learning in many ways, from vocabulary acquisition (Chukharev-Hudilainen & Klepikova, 2016; Çavuş & İbrahim, 2009; Smith, 2004; Yunus, Salehi, & Amini, 2016) to gains in grammar acquisition (Fiori, 2005; Sadeghi & Dousti, 2013), perception and production of certain phonemes (Liakin, Cardoso, & Liakina, 2015, 2017) and pronunciation in general (Cardoso, Grimshaw, & Waddington, 2015; Liakin, Cardoso, & Liakina, 2015, 2017; Payne & Whitney, 2002; Seferoğlu, 2005), and learner motivation (Chapelle, 2009; Ekoç, 2014; Mutlu & Eröz-Tuğa, 2013).

However, many studies also indicate high rates of user dropout from the language learning apps or software, since users often leave them before completing their courses (e.g., Garcia-Botero & Questier, 2016; Krashen, 2014; Nielson, 2011; Şendurur et al., 2017;

Vesselinov & Grego, 2012). Although some studies give partial observations about what might have caused dropout, none of the studies, to our knowledge, focuses on what underlying factors lead to users' decision to abandon an app.

What is App Attrition?

The term *attrition* is used to describe various phenomena and concepts. The first distinction to make is to emphasize that app attrition is different from *language attrition,* which describes the process of loss or deterioration of certain qualities of a speaker's language use, caused by changes in the linguistic environment, language habits or language abandonment (Schmid, 2011). The term is also different from learner/student attrition, which is the loss of motivation in learners that eventually leads to discontinuation and/or dropping out from an institution.

There are various studies in the literature that investigate student attrition (Stiller & Köster, 2016; Wesely, 2010), which is considered as the opposite of *persistence* or *continuation* (Cunningham, 2010; Holt, 2006; Kondo, 1999; Speiller, 1988), and *retention* (Delleville, 2014; Maracle, 2002; Tinto, 2006).

We propose the term 'app attrition', which could be defined as the process that leads language learners to drop out of an app due to a series of internal and external factors.

App attrition is not interchangeable with the term 'dropout'; it is, rather, the embodying process that leads to dropout. In other words, to drop out refers to the decision taken by users to abandon an app; whereas app attrition refers to a process that leads to the decision to drop out.

The background that inspired this study was the literature on effectiveness studies conducted in CALL, which reported high levels of learner dropout from various apps, including Duolingo (e.g., Garcia-Botero & Questier, 2016; Guarnieri, 2015; Krashen, 2014; Nielson,

2011; Şendurur et al., 2017; Vesselinov & Grego, 2012). However, no study has so far evaluated the underlying process that leads to learner dropout, which we call app attrition. In this study, we specifically investigate what factors cause app attrition in a specific language learning app, Duolingo.

What is Duolingo?

Duolingo is a "massive-scale online human collaboration project" launched in 2012 with the aim to translate the worldwide web into major languages while providing language education to learners around the world for free (https://tinyurl.com/jhn42xk). It is more popular for the smartphone/tablet edition, although it also has a version for stationary computers and laptops.

In Duolingo, users are initially expected to go through a placement test to define their proficiency level. After this test, they are given a series of drills and exercises according to their level in various subjects, which are called skills (e.g., family, fruits, numbers, adjectives, present tense, past tense). Based on the subjects they visit and words/phrases they use, the app stores data about the individual's memory of certain subjects and words (also known as 'strength'), which are later used for creating content for future skills. Users are typically expected to improve the four learning skills (i.e., reading, writing, speaking and listening) through a variety of tasks, mainly translating, transcribing, matching word pairs, filling in blanks and so forth.

Duolingo's method is based on two pillars: one that is behavioristic (e.g., employing grammar drills, exercises and learning tasks in a gamified setting, with skill trees, experience bars, goals, reminders, colorful graphs and sounds as feedback for correct or incorrect answers) and one that is social constructivist and connectivist (e.g., encouraging a social way of learning that occurs through interaction of a web of peers, facilitated by discussion forums, user clubs,

social media, competitions and real-life meetup events). Therefore, our study aims to identify the factors behind app attrition in Duolingo, focusing on the features that facilitate learning via its unique method.

We believe that our study contributes to the field in terms of identifying and understanding user attrition in a very typical CALL (and MALL) environment as we attempt to set the groundwork for establishing an approach to evaluate app attrition in CALL. In addition, we also focus on the likelihood of the attrition factors to result in user dropout, i.e., comparing users' perceptions about certain features of Duolingo with their user status (remained active or dropped out). Therefore, our findings and data can benefit future researchers and developers in the field who would like to further investigate app attrition and explore user retention in CALL settings. For software creators, our findings could help app designers focus their efforts on specific functions and limitations based on former and current Duolingo users' perceptions, inspire new approaches and methodologies for CALL researchers, and finally, help learners and teachers come up with better ways to integrate apps like Duolingo into their courses and/or use them more effectively. Because Duolingo is a dynamic app that receives periodic updates and changes, any possible pedagogical contributions of our study with regards to specific features might be valid only for a short period of time. However, our study could help Duolingo and similar CALL apps to improve their methods and approaches, since it addresses an issue (user dropout) that is common in many CALL apps, and that has not been systematically investigated.

Since this is a manuscript-based MA thesis, the following, central chapter is a stand-alone research paper (as indicated in McGill University's manuscript-based thesis guidelines)[1] in which parts of this chapter are sometimes repeated in condensed form.

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[1] https://www.mcgill.ca/gps/thesis/thesis-guidelines/preparation

Chapter Two

Computer-assisted language learning (CALL) is a technology-mediated way of learning a language. The field encompasses mobile-assisted language learning (MALL) as well and focuses on a wide range of language learning technologies. Among these technologies are language learning apps (LLAs), which have become popular since the spread of the internet and smartphones. Over 4 billion people around the world own a mobile device (Statista, 2016) and check it, on average, seventy-six times a day (Naftulin, 2016). Several LLAs offer individualized, self-directed, low-cost and online ("anytime anywhere") language learning, making technology-assisted language learning a trend for many L2 learners. Duolingo, which has over 150 million registered users across the world (Alfaro, 2016; Guliani, 2016), is one of these apps/websites, the total enrollment of which worldwide is "more than the total number of students in all U.S. elementary and secondary schools combined" (Streeter, 2015).

Researchers suggest that CALL could enhance language learning in many ways, from vocabulary acquisition (Chukharev-Hudilainen & Klepikova, 2016; Çavuş & İbrahim, 2009; Smith, 2004; Yunus et al., 2016) to gains in grammar acquisition (Fiori, 2005; Sadeghi & Dousti, 2013), perception and production of certain phonemes (Liakin, Cardoso, & Liakina, 2015, 2017) and pronunciation in general (Cardoso et al., 2015; Liakin et al., 2015, 2017; Payne & Whitney, 2002; Seferoğlu, 2005), and learner motivation (Chapelle, 2009; Ekoç, 2014; Mutlu & Eröz-Tuğa, 2013), to cite some of the areas that have benefited from this approach to language education. LLAs such as Duolingo have also been examined to test their effectiveness as pedagogical tools. These studies have reported mixed results. For example, many suggest that Duolingo is a user-friendly, approachable and useful app for language learning (Ahmed, 2016; Munday, 2016; Nushi & Eqbali, 2017; Şendurur et al., 2017), which is effective as a

complementary tool for classroom teaching (Garcia-Botero & Questier, 2016; Munday, 2016) and as a self-regulated language learning app (Vesselinov & Grego, 2012).

On the other hand, researchers also have concerns that these types of LLAs may not be as effective as they purport to be, due mainly to their chosen pedagogical approaches, which foster conscious rather than subconscious language learning (Krashen, 2014) and antiquated pedagogies such as the grammar-translation method rather than more communicative approaches (Ahmed, 2016; Garcia, 2013; Nushi & Eqbali, 2017). Some studies also suggest that motivational issues and the need for external motivation (Garcia-Botero & Questier, 2016) as well as human support and guidance (Garcia-Botero & Questier, 2016; Nielson, 2011; Şendurur et al., 2017) could play a role in the lack of LLA effectiveness.

A common finding among these studies, which examine the Duolingo app as a learning tool, is that users tend to leave the app before completing all the courses (Garcia-Botero & Questier, 2016; Krashen, 2014; Şendurur et al., 2017). A second finding about Duolingo was that the app appeared to be less effective for more advanced users (or for experienced users, who spent more time in the app) than it was for beginners (Ahmed, 2016; Garcia-Botero & Questier, 2016; Munday, 2016; Şendurur et al., 2017; Vesselinov & Grego, 2012).

We sought to investigate what factors contribute to this process, which we call app attrition, leading users to drop out from Duolingo. To examine the subject matter, we focused on Turkish (L1) users learning English (L2) as a foreign language with the app/website Duolingo. To our knowledge, there are no studies that have investigated app attrition in the context of CALL or MALL.

Background

Effectiveness of Language Learning Apps

CALL apps are sophisticated tools that are tailored to automatize language learning with complex algorithms, having their roots in domains of computer science (Settles & Meeder, 2016; Streeter, 2015) as well as other technologies falling under computational linguistics, such as text-to-speech (TTS) and automatic speech recognition (ASR). The implementation of these technologies makes LLAs attractive, "hi-tech", and quite popular in the eyes of millions of users. For this study, however, a question that remains is: how pedagogically effective are these apps?

There are many approaches to evaluating effectiveness in CALL: some studies make a *comparison between* (x vs. y) the app (x) and a traditional course/lecturer (y) (Sivaram & Ramar, 2014); while others evaluate an app *within itself* by implementing language tests before and after treatment (x_1 vs. x_2) (Vasselinov & Grego, 2012), or by referring to learner feedback qualitatively (Munday, 2016). This presents a difficulty in reviewing the literature as the concept of effectiveness remains somewhat unclear. That is to say, each study on the effectiveness of Duolingo should be analyzed in the specific learning context in which it was evaluated (in a classroom, in a self-regulated setting, etc.).

In a classroom setting, Munday (2016) examined the effectiveness of Duolingo as a complementary tool for two university classes: one a beginner's Spanish course (A1) and the other an advanced intermediate Spanish course (B2). The study aimed to evaluate Duolingo's effectiveness as an alternative for regular textbook-based homework. According to the results, the majority of the beginners (84.8%) found Duolingo to be more effective than other types of textbook-style homework, while a substantial group of relatively more advanced B2 students (43.8%) found Duolingo to be no different than regular language exercises. Munday concluded

that practicing in Duolingo (as compared to textbook exercises) was less effective for advanced users than it was for beginners.

In a self-regulated setting, a study by Vesselinov and Grego (2012) involving 196 participants evaluated Duolingo's effectiveness in teaching Spanish (L2). The report concluded that a successful average increase of 2 points in WebCAPE scores (a test developed by Brigham Young University) could be achieved for an hour of Duolingo study. The study revealed two interesting findings: the main driver for success was the motivation of the participants (e.g., participants using Duolingo for travel purposes gained more mileage out of it than those studying for personal interest) and participants who were beginners learned more than advanced participants, proportionately speaking, suggesting a ceiling effect (Vesselinov & Grego, 2012).

Duolingo as a Pedagogical Tool

Duolingo was created by Carnegie Mellon University professor Luis Von Ahn and his student Severin Hacker in 2011. It offers 27 free language courses via an app, available for mobile phones and tablets (Android, iOS), and a website, also available for laptops and stationary computers. Besides giving access to a language learning platform, Duolingo also provides a language proficiency test, the Duolingo English Test (a proficiency test for non-native English speakers; https://englishtest.duolingo.com/partners), which will not be addressed in this study.

Duolingo teaches foreign languages in a gamified setting using the four skills (i.e., reading, listening, speaking, and writing), thus providing opportunities for multimodal activities such as translation, transcription and dictation. More specifically, the main tasks that users are typically expected to engage in when using Duolingo are: to translate (providing linguistic equivalences across languages), to transcribe (typing in words and sentences they hear), to dictate (pronouncing words and sentences aloud), to tap on words (constructing a sentence by

selecting from an array of words), to fill in blanks (completing partial sentences), to match word cards (with pairs), and to associate images with words or phrases. See Figure 1 for examples of typical language exercises in a Duolingo course.

Figure 1

Examples of typical learning exercises in Duolingo
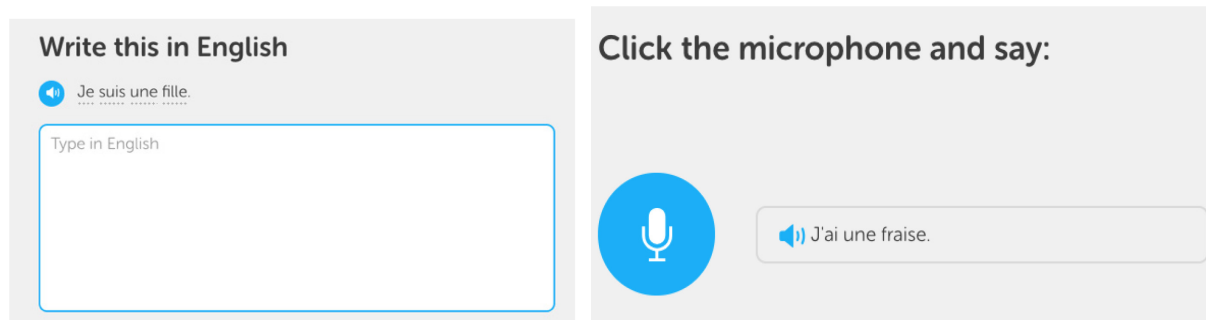
The curriculum of Duolingo is broken up into themed units called 'skills' that foster thematic vocabulary acquisition in categories such as 'family', 'animals', 'fruits' and 'vegetables', as well as units covering grammar topics such as the present perfect tense and the simple past tense (Teske, 2017). Users can choose what they wish to study among these units; however, there is also a provisioned path that is defined by Duolingo, which starts with basics and unlocks further into advanced learning topics. Users are not able to access advanced topics before they complete a set of basic topics; rather, they proceed through topics after mastering each level in turn.

The app introduced *Duolingo bots* in 2016, an attempt to provide practicing venues for users. In the form of a texting interface, the bots offer learners task-based opportunities to engage in a discussion with the artificial intelligence (AI). However, the subjects that learners can chat about with the bots are limited and the feature is only available for a few languages and platforms (e.g., it is only available at the App Store; it is not available for Android devices or computers).

Duolingo also fosters opportunities for social peer-to-peer learning via three channels that are available to learners so that they can collaborate with others: Duolingo discussion forum, Duolingo (in-app) user clubs, and Duolingo events.

Duolingo Discussion Forum is a website where learners can open threads for various subjects and learn from each other or from volunteer native speakers, teachers or moderators (https://forum.duolingo.com). Monitored by moderators, discussion topics serve as a platform for collaborative and peer-to-peer learning on various topics, such as linguistic issues or difficulties that users cannot overcome on their own. Users are prompted to click on a button that leads them to the forum whenever they answer a question incorrectly; they are directed to a dedicated thread for feedback on each specific exercise. Figure 2 illustrates a peer-to-peer interaction in Duolingo.

Figure 2

Learners of Turkish (L2) conversing via the discussion forum
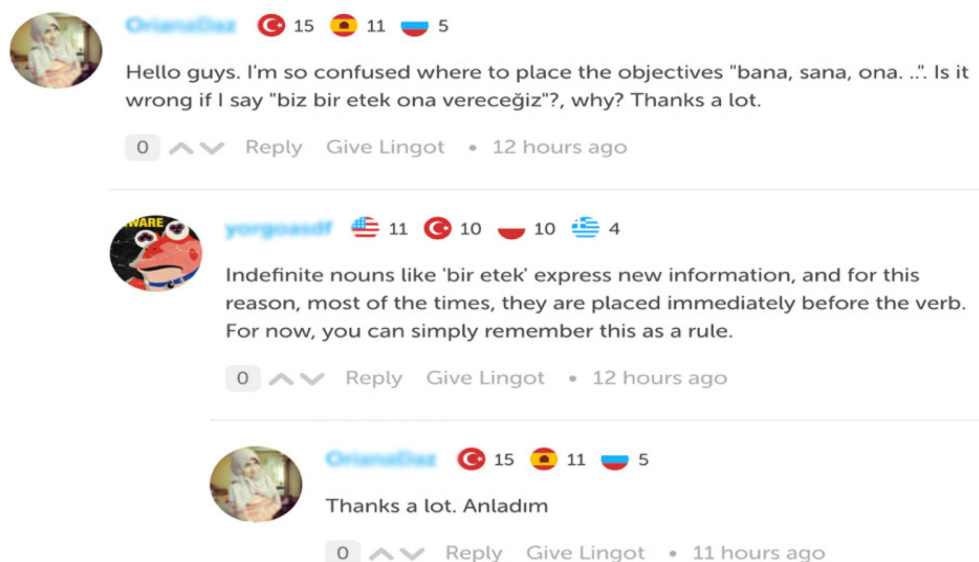
Another channel for communication is provided by the user clubs, which were intended for promoting online interest groups (e.g., Paris lovers) and/or regional clubs (e.g., Boston

Spanish learners), in which users motivate, practice and socialize with each other online (https://forum.duolingo. com/comment/19948358/Introducing-Duolingo-Clubs).

Finally, Duoevents are another channel for users to meet and communicate with other users (https://events.duolingo.com/). Duoevents has a website that shows upcoming meetups in major cities, which convene Duolingo users around the world on a regular basis in order to create local communities of learners that learn and practice languages with each other in real-life settings.

Apart from these regulated channels, Duolingo is considered as a type of social media because each user has a profile by default (including an avatar, friends list, achievements, and daily login history) which is discoverable by others. Users can race with friends in Duolingo's shared leaderboard by challenging each other based on the points collected upon completing lessons, tests or activities. Users are constantly encouraged to chat with each other by using the communicative tools that promote in-app interaction and to share their achievements in Duolingo on social media.

In sum, Duolingo is a platform erected upon two pillars: one that mobilizes discussion forums, in-app clubs, meetup events and various other communicative tools to provide a 'social' kind of learning; and one that mobilizes grammar drills, exercises, tests and various other tasks that fosters a 'behavioristic' learning.

Duolingo and Learning Theories

Duolingo provides grammar-translation exercises and numerous opportunities for social learning. The reason why its method depends highly on translation can be attributed to its business model: aside from the free language instruction it offers, the platform claims to translate the web (e.g., Wikipedia pages, CNN articles) by using learner inputs yielded in the learning process to validate machine translations (Von Ahn, 2014). While the way Duolingo

can mold these inputs into commercially viable translations is not entirely disclosed, it is important to underline that this policy makes Duolingo's language pedagogy depend heavily on translations, in other words, the grammar-translation method.

The grammar-translation method (GTM) is an approach to language teaching that has become obsolete in the Anglo-American sphere of influence (Block, 2003; Celce-Murcia, 2014; Howatt, 1984; Larsen-Freeman, 2000), especially since the introduction of approaches that promote communicative competence as the goal of language instruction. For these scholars, communicative competence is not only concerned with 'what is grammatical' but also 'what is appropriate in a given social situation' (Chang, 2011, p.14). Therefore, the grammar-translation method is usually criticized for its orientation to prepare learners to succeed in standardized tests (Rivers, 1968), rather than preparing learners for social, real-life interactions. GTM is also criticized by other scholars who reject the view of language learning as a linear process of acquiring an 'ultimate grammar' (Keck & Kim, 2014). This misconception, they believe, not only discourages learners, but also contributes to a monolingual bias (Keck & Ortega, 2013).

Despite the drawbacks described above, some scholars advocate the pedagogical use of translation. Campbell (2002), for instance, defines translation as the fifth macroskill, a skill to be mastered by not only professional translators but also language learners ("fifth skill" here is meant as an addition to speaking, writing, reading and listening). Furthermore, Cook (2010) suggests that translation mitigates learner anxiety, promotes noticing, and increases metalinguistic awareness by assisting learners to relate new knowledge to old knowledge. It enables taking advantage of metalinguistic awareness and descriptive grammar, which is a good scaffold for language learners.

In Duolingo, translations are used to introduce new vocabulary in the target language. However, users are not given translated vocabulary lists or dictionary definitions to memorize

as in a typical grammar-translation class. Rather, users go through a hypothesizing process where they develop strategies to reach correct answers and, when necessary, use translations as hints or scaffolds. In addition to hints, there are also short, informative grammar notes called 'tips' that can be accessed prior to or during the lessons. An example of a learning tip in Duolingo is illustrated in Figure 3, involving an information note on relative pronouns in English for Turkish users in Dulingo:

Figure 3

Learning Tips in Duolingo Website Edition

- which: cansızlar ve hayvanlar için
- who/whom: insanlar için
- that: which veya who yerine kullanılabilir
- where: yer bilgisi için

CALL pedagogies depend heavily on learning theories borrowed from educational psychology and language learning. The history of CALL, likewise, followed the same path as in those disciplines, that is, a shift from behavioristic to communicative approaches (e.g., Behavioristic CALL to Communicative CALL, then to integrative CALL) (Warshauer, 1996). In Duolingo, three approaches appear to form the backbone of pedagogy: behaviorism, social constructivism and connectivism.

Understanding behaviorism is the first key to understanding the rationale behind Duolingo. According to behaviorists, knowledge is a repository of behavioral responses to environmental stimuli (Skinner, 1976). Behavior is motivated extrinsically, and learning is fostered through repetition and reinforcement. In Duolingo, the learning relies on rewards (i.e., points, badges, unlocked extra content, virtual currency and medals) as well as colors, sounds, alarms and other stimulating tools to keep the users motivated and focused. These instruments

are used to reward the good behavior of the learner, as against punishment (losing game points) for the undesired one, in the form of negative feedback. For instance, Duolingo uses green colors and 'positive' sounds whenever the user submits a correct answer, and red colors and 'negative' sounds to alert the user that the answer is either incorrect or needs revision.

Regarding feedback in Duolingo, three types of feedback are available: (1) corrective feedback (Llinares & Lyster, 2014), which lets the learner know whether their answer is right or wrong, and guides the learner to correct the mistake (e.g., pop-up messages that are displayed in Duolingo showing the user earning or losing points); (2) status feedback (Cayton-Hodges, Feng, & Pan, 2015), which shows the current status of learning task completion or problem solving, and how much of the learning objectives has been achieved (e.g., level indicators, experience bars, daily streak and word strength indicators); and (3) conceptual feedback (Bokhove & Drijvers, 2010), which prompts the learner to reconsider, or even think deeper about, his/her understanding of the learning content (e.g., the pop-up messages that reveal hints after making mistakes). While the first and second types of feedback are dominant in Duolingo, the third (conceptual feedback) is less available, which limits creative thinking and/or sophisticated answers to various questions/tasks. In most situations, progression in Duolingo does not allow more than a single (orthodox) correct answer, which is unlike real-life conversations or learning situations.

On another note, Duolingo supports its learning method with gamification (i.e., by gamifying certain tasks and adding gamification elements in the learning setting) which is reported to increase user engagement and motivation (Hoffman & Nadelson, 2010; Watson, Mong & Harris, 2011; Werbach, 2014). As a serious game, the most characteristic and notable gamification feature of Duolingo that helps with motivation is the daily streak (an activity counter that shows users' uninterrupted daily activity in the app). However, users of Duolingo

have mixed opinions about the streak: some users suggest it motivates them to practice (https://forum.duolingo.com/comment/34314427/The-daily-streak-keeps-me-motivated) and some believe it demotivates them when it is eventually lost and even consider dropping out (https://forum.duolingo.com/comment/32969796/The-streak-thing-almost-made-me-leave-but-why). This form of extrinsic motivation gamifies the process and enables users to engage in competition based on the number of days they have been practicing uninterruptedly. However, according to self-determination theory (Deci & Ryan, 1985; Deci & Ryan, 2000), sources of extrinsic motivation can also undermine autonomy (one of the three pillars for motivation) and decrease user motivation.

From a social constructivist standpoint, the side-tools of Duolingo (i.e., discussion forums, user clubs, events, user profiles, blogs etc.) appear as a clear attempt to address some of the app's limitations, especially those of a communicative or interactive nature. However, this is not easy to accomplish in an app, as learners use the tool in a self-regulated manner, in social isolation. Social isolation has been cited as one of the major challenges in self-regulated learning environments (Guarnieri, 2015). Social constructivists hold that learning is constructed as a result of authentic experience obtained through interactions with a knowledge community (Vygotsky, 1978; Jonassen, Davidson, Collins, Campbell, & Bannan Haag, 1995; Jonassen, 1999). Duolingo, therefore, intends to compensate for the social isolation by promoting online peer-to-peer interaction as much as possible, which is reflected on Duolingo's webpage for events, for example, "join the world's largest community of learners" (http://events.duolingo.com). The idea of communities of learners (Rogoff, 1994) was erected upon the premise that learning occurs with sociocultural activity among learners and motivates learners with a sense of belonging to a community with a common (collaborative) learning goal.

The final theory behind the conceptualization of Duolingo is connectivism (Downes, 2010; Siemes, 2005). Connectivist theory focuses on how technology and internet have created new opportunities for learners to interact and share information with each other. The approach to learning is very similar to that of social constructivism. Learning is also held to be a social and active phenomenon. According to connectivists, however, "learning occurs when knowledge is actuated through the process of a learner connecting to and feeding information into a learning community" (Kop & Hill, 2008, p. 2). As observed in the examples of Duolingo clubs and discussion forums, a learning community is shaped by clustering of similar areas of interests that allows for dialoguing. Similar to a peer-to-peer system, connectivists view learning as a process of connecting specialized nodes or information sources, which is more critical than adopting knowledge as is. Hence, it requires two key skills: the ability to seek out current information and the ability to filter secondary and extraneous information (Kop & Hill, 2008). Duolingo users are similarly expected to adapt/perform well in a network of connective learning, where they should seek out additional information by engaging in dialogue with other nodes, and, at the same time, filter all irrelevant information. These additional processes that users have to go through in Duolingo give important clues about app attrition in CALL settings, which will be discussed in the following sections.

App Attrition

The term *attrition* is used in literature to describe the gradual reduction of the strength or effectiveness of a quality (e.g., language attrition, student attrition). Language attrition, for example, focuses on the loss or deterioration of certain qualities of a speaker's language caused by changes in linguistic environment, language habits or language abandonment (Schmid, 2011); this concept is not related to the current study. Studies on *student* attrition, on the other

hand, are relevant to our study since this type of attrition resembles the process which leads to dropout in an educational program.

In the literature, the term 'student attrition' is used as the opposite of *persistence* (Cunningham, 2010; Holt, 2006; Kondo, 1999; Speiller, 1988), and *retention* (Delleville, 2014; Maracle, 2002; Tinto, 2006). Although these studies investigate student attrition, the findings and models are not directly transferrable to the language learning *apps,* which are different learning settings in many ways.

We therefore propose the term 'app attrition', which we define as the process that leads language learners to drop out of an app due to a set of internal and external factors. App attrition is not interchangeable with the term *dropout*; it is, rather, the embodying process that leads to dropout. In other words, to drop out refers to the decision taken by users to abandon an app; whereas app attrition refers to a process that leads to dropout. To examine app attrition, our study focuses on Duolingo learners from both ends: active users of the app and dropouts who left the app.

The background that inspired this study was the literature on effectiveness studies conducted in CALL, which reported high levels of learner dropout from various apps (Garcia-Botero & Questier, 2016; Guarnieri, 2015; Krashen, 2014; Nielson, 2011; Robin, 2013; Şendurur et al., 2017; Vesselinov & Grego, 2012). However, no study has so far evaluated the contributing factors or how to evaluate app attrition. Our study aims to identify the factors behind app attrition in Duolingo and, consequently, to set the groundwork for establishing an approach to evaluate app attrition in CALL.

Factors Triggering App Attrition

For a typical learner, making the decision to download an app or visit a website is often less complicated than enrolling in paid, full-length language courses because it requires no

registration, regular attendance, or the payment of (sometimes exorbitant) fees. This ease of access and low degree of commitment, however, can make it easier for language learners to give up apps like Duolingo compared to full time courses (e.g., Garcia-Botero & Questier, 2016; Krashen, 2014; Nielson, 2011; Şendurur et al., 2017). Nevertheless, very little is known about the factors that trigger app attrition in CALL settings, and the existing studies offer very limited explanations of the possible reasons. As mentioned earlier, there was no stand-alone model or research methodology in the literature that our study could rely on. Therefore, in this section, we borrow and adapt insights from CALL and Non-CALL (i.e., not involving a CALL component) literature to identify factors that may potentially contribute to app attrition in Duolingo: limited learner control, social isolation, inauthenticity (e.g., machine-generated content), poor quality of instruction, lack of success, lack of guidance, decreased motivation, anxiety, and technical issues (an umbrella category for all app instabilities, crashes, freezes, etc.).

Garcia-Botero and Questier (2016) examined the Duolingo language learning experience of 118 Colombian post-secondary students to understand whether the app could foster students' self-directed learning. After data collection with surveys, interviews and individual app tracking, the study revealed that even if students were formally introduced to a convenient and motivating app such as Duolingo, only approximately 10% (12 out of 118) of the students managed to finish the course, indicating a striking 90% drop-out rate. The authors concluded that although learners' overall perceptions about Duolingo were positive, "for substantial MALL usage, a combination of incentives, scaffolding and curricular integration [guidance] are needed." (p. 154). When the students were asked about the observed dropout rate, they indicated that their low level of participation was due to personal obligations and the lack of an external motivation to finish the course (Garcia-Botero & Questier, 2016).

Another study conducted on a similar language learning app (Rosetta Stone) to investigate the efficiency of CALL in the workplace (Nielson, 2011) revealed 'striking findings on severe participant attrition' (p. 110). Although the goal of this study was not to examine attrition or its underlying causes, it found that the high attrition rate observed was likely due to three main reasons: technological shortcomings, lack of guidance available for learners, and the non-authenticity of the instructional content.

Furthermore, a study conducted by Guarnieri (2015) in an online Italian language course at Bronx Community College, pointed to various reasons for attrition: poor knowledge about how to register for the course, gaps between technology-mediated learning and formal academic objectives, technical issues, and social isolation. The study also concluded that students in online learning contexts often feel insufficiently supported or encouraged, which results in a loss of interest or decreased motivation (p. 168). While some of the reasons were specifically related to that particular course and its registration processes—which may not be applicable to Duolingo— social isolation, decreased motivation and technical issues could be relevant.

Another factor for attrition was put forward by Robin (2013), who suggested that attrition levels in self-regulated settings tended to be higher because students cannot control the learning. According to Robin, many learners in self-study contexts want to shape and modify their learning experiences; however, they are either limited by the app or are not capable of doing so, resulting in higher attrition rates.

Finally, a study by Wesely (2010) focused on attrition in two relatable contexts: "traditional" (i.e., Non-CALL) and immersion foreign language programs. Building on Tinto's (1975) model for drop-out from higher education, Wesely laid out four factors for language course attrition: [decreased] motivation, [poor] instruction quality (understanding the methods used and approving them), [learner] anxiety (presence, or other types of anxiety), and academic

success (ability to achieve and progress) in the course (p. 807). All factors adapted to and adopted in our study are hypothesized to cause attrition, as suggested by the literature reviewed. The factors were modified and sorted into nine separate categories considering the nature of the learning environment: e.g., inauthentic (unintelligible) content was separated from technical issues, while lack of teacher scaffolding and guidance were merged into one category (i.e., lack of guidance). Nevertheless, there might be a complex relation between and among the factors, and multiple factors can be perceived as being the same. For some users, for example, social isolation caused by the learning environment may also result in decreased motivation, which might also fuel a lack of success in completing some of the proposed language-learning activities. For others, these factors may not be perceived as interrelated.

To conclude, it is possible that some factors might be perceived simultaneously, and/or occasionally due to similar or identical underlying reasons. However, the main goal of our study is to understand whether a factor is perceived more significantly than others as contributing to attrition, as opposed to evaluating the possible relations the factors may have among themselves.

The Current Study

The study examines the factors that can contribute to app attrition in CALL, focusing on Duolingo and the nine themes explained in the previous sections, which we hypothesize to impact app attrition. The main general research questions (RQ) that guided our investigation were: (1) What factors do L2 learners perceive as contributing to app attrition in Duolingo? (2) Among these factors, which are more likely to cause dropout? These two general questions were divided into the following sub-components (each representing a specific factor or theme under consideration):

1. What factors do L2 learners perceive as contributing to app attrition in Duolingo?

a) Poor quality of instruction

b) Limited learner control

c) Learner anxiety

d) Reduced motivation

e) Social isolation

f) Lack of success (being unsuccessful in the app)

g) Lack of guidance

h) Inauthenticity (machine-generated written and oral content)

i) Technical issues

2. Which of the nine factors are more likely to cause dropout from Duolingo?

We gathered data on participants' perceptions about which factors were relevant to app attrition in Duolingo (RQ1, via six-item Likert scales) and whether they had an impact on their decision to drop out from the app (RQ2, via 3-option multiple-choice questions).

Method

Participants

The participants consisted of Turkish adults learning English as a foreign language with Duolingo, who were recruited on the web and various social media platforms. The pool of participants included both active users and dropouts.

The survey yielded a total of 96 results, with 17 respondents being disqualified because they did not meet the study's requirements: they were either studying or spoke other languages (n=9) or had lived in countries other than Turkey (n=8). Therefore, the total number of participants eligible for analysis was 79, of whom 76 (94.9%) accessed Duolingo from mobile phones, 31 (39.24%) also used computers, and 10 (10.27%) used tablets. Many participants accessed Duolingo from more than a single device.

The demographic background of our participant pool was as follows:

- Age (18-63, median=29),

- Sex (male=41, female=35, other/not specified=3),

- Proficiency level (Advanced=21, Upper-Inter=18, Pre-Inter=27, Beginner=13),

- Education level (Undergraduate=45, Graduate=20, Primary/High School=14)

In addition, the Duolingo usage of our participants was qualified as follows:

- Weekly usage (0-1 hour=21; 1-2 hours=22; 2-6 hours=17; 6+ hours=19),

- Platform used (Smartphone: 94.9%; Desktop/Laptop: 39.24%; Tablet: 10,3%)

- User status (Active User=44, Dropout=35)

Materials

Our study followed a mixed-type methodology, gathering quantitative and qualitative data about users' perceptions. To answer the main research questions, we benefited from two types of materials: surveys and follow-up interviews.

Participants were asked to fill out a two-part survey: The first part of the survey gathered specific demographic data about the participants as well as Duolingo-specific data such as frequency of use and type of device utilized. The main survey included the 39-item survey questionnaire, subsumed into the nine categories.

Following the survey, we conducted interviews with 8 participants who volunteered to participate, in order to obtain in-depth information and insights about the nine targeted factors. The qualitative data provided by participants were especially important to assess how users perceived the factors under investigation.

Procedure

Our main survey questionnaire was initially piloted with MA students from McGill University's Faculty of Education (n=10) who were users of Duolingo. The reason for piloting

was to ensure that the sub-items (statements and questions) in the survey were pertinent and relevant to the nine targeted factors (construct validity). Building on the feedback from the pilot tests, some of the sub-items were discarded and/or paraphrased to obtain an optimum degree of uniformity and clarity. Some factors were merged into one category to avoid overlapping or repeated factors. The survey questions were translated by the principal investigator, a notary-certified translator, and later verified by another certified translator. The refined instruments were finally piloted with Turkish individuals (n=6) who live in Montreal, Canada, and who identified themselves as Duolingo users.

The survey was conducted online via Google Forms in Turkish (see Appendix A and B). The direct web link was shared on various platforms such as Facebook, Duolingo groups, Duolingo forums, WhatsApp, Instagram, and eksisozluk.com (a popular discussion website in Turkey) to reach a wide participant pool of Turkish Duolingo users. We obtained relevant permissions for posting the ads and included the participant consent form in the first page of the survey questionnaire. We established a temporary website (https://halukolcaytuncay. wixsite. com/duolingo) to ensure that the participants were informed at all times about the motives, scope and steps of the study, as well as of the withdrawal procedure, even if the original ads/posts were removed from their original venues. The survey also included a tick-box to identify participants who wished to participate in the follow-up interviews, which were conducted after the survey.

For the interview, we contacted 8 participants among those who agreed to participate. To ensure equal representation in the selection phase, two pools were created based on user status (Dropout: n=4; Active: n=4). The selected interviewees also had a balanced distribution in terms of proficiency level (Beginner: n=1; Pre-Intermediate: n=3; Upper-Intermediate: n=1; Advanced: n=3). Users' status and proficiency level were determined based on their responses

to the questions in the demographic survey (Q.2: "Are you still using Duolingo?" and Q.10: "What is your proficiency level in English according to your own estimate?"; see Appendix A). Constraints of time and logistics made it impractical for us to use a separate measure of proficiency.

The interviews were conducted online, after which the participants received a compensation of 40 Turkish Liras. Interviews were audio-recorded for transcription purposes. These were discarded after the data were transcribed, translated and de-identified.

Design and Data Analysis

The study followed a non-experimental research design. The main survey questionnaire (see Appendix B) consisted of nine categories allocated for each factor under consideration (see Table 2). Specifically, the categories were:

Table 2

Distribution of survey items based on themes and related research question

RQ	Factor	Items	Operationalized as users' perceptions on:
1a	Poor instructional quality	1-4	*Instruction, method and features of the app*
1b	Limited learner control	5-8	*Customizability and control over content*
1c	Learner anxiety	9-12	*Anxiety and stress caused by activities in the app*
1d	Reduced motivation	13-17	*Self-motivation and how the app motivates learners*
1e	Social isolation	18-22	*Communicative opportunities and social features*
1f	Being unsuccessful	23-26	*Successfulness in the activities/drills in the app*
1g	Lack of guidance	27-30	*Guidance or supervision provided by the app*
1h	Inauthenticity	31-35	*Automatized written and oral content in the app*
1i	Technical issues	36-39	*Stability of the app (e.g., bugs, freezes, crashes)*

To discover which factors are more likely to cause dropout, each of the nine categories contained two types of questions: (1) 3 or 4 statements, which were inspired by or adopted from previous research on users' perceptions of what may cause (or may have caused) app attrition, using an integrated Likert-type scale ranging from "completely agree" to "completely disagree" (note that a six-point scale eliminates the middle option, where participants could remain neutral); and (2) a multiple-choice question of three options (e.g., learner anxiety caused me to drop out of the app / can cause dropout from the app / did not or does not cause dropout) to be able to filter the participants who (perceived that they) dropped out due to the factor under consideration. Following is an example involving "learner anxiety", one of the targeted categories:

Table 3

Sample from the Main Survey Questionnaire

3) Anxiety:

Statement	Completely Disagree	Disagree	Somehow Disagree	Somehow Agree	Agree	Completely Agree
9- I **feel anxious** learning a language in Duolingo.	1	2	3	4	5	6
10- I **feel anxious** when I practice with other learners in Duolingo.	1	2	3	4	5	6
11- I **feel anxious** to know that others can see my progress in Duolingo.	1	2	3	4	5	6

12- Considering my overall anxiety in Duolingo:

    a. Anxiety issues caused me to drop out of the app.
    b. Anxiety issues can cause dropout from the app.
    c. Anxiety issues does not/did not cause dropout.

To answer RQ1c ('Do L2 learners perceive [anxiety] as contributing to app attrition in Duolingo?'), we examined the responses of both active users (n=44) and dropouts (n=35) on the relevant survey items, namely items 9, 10 and 11. We measured how strongly each group perceived anxiety as a factor in Duolingo based on their own experience, by selecting from a six-point Likert-scale. Based on feedback received during pilot-testing, keywords were bolded in each statement to call the participants' attention to what was relevant. Some of the statements were phrased in negative voice, and therefore, their scores were reversed in the calculation phase.

The multiple-choice question at the end of the category was adopted to identify which factors participants perceived as specifically triggering the dropout. Using the same example illustrated above, while option (a) identified participants who dropped out due to 'learner anxiety', option (b) identified participants who perceived that factor as a possible contributing

factor but did not leave the app because of it; finally, option (c) identified users who neither perceived it as a factor nor dropped out from using the app because of it. Thanks to this step, we were able to filter the participants into two groups (i.e., dropped out/did not drop out) for each factor. Although a two-option "yes/no" question would have been adequate to identify these groups for our study, we included a third option (option b) to differentiate active users from dropouts (option a) for further analysis in the future. For our analysis, we simply grouped them in two: those who dropped out due to a factor (option a) and those who did not (option b or c).

After sorting our participants into two pools for the nine targeted factors, we compared the data collected by Likert scales to answer research question b ('which of the nine factors are more likely to cause dropout from Duolingo?'), using unpaired t-tests. We named the pools as 'dropped out' and 'remained' for ease of exposition. Then we tested the likelihood of participants who perceived a factor as contributing to app attrition to be in $Group_1$ (dropped out); and those who did not perceive that way to be in $Group_2$ (remained). We assumed that factors statistically differing with a level of significance ($p < 0.05$) were more likely to cause dropout.

The semi-structured interviews (see Appendix C), on the other hand, were designed to gather qualitative data about the factors that contribute to app attrition. Participants (n=35) who dropped out were asked about the underlying reasons behind their decision to quit Duolingo. Participants who were active users (n=44), on the other hand, were asked if they ever considered dropping out or if they had experienced any issues whatsoever. Table 4, below, illustrates the logic-schemes of two interview questions:

Table 4

Logic-scheme of the Interview Questions

Dropouts	➔ Why did they drop out?	What factors contributed to app attrition in Duolingo?
Active Users	➔ Are they likely to drop out?	➔ IF YES: What is causing app attrition?
		➔ IF NO: Are they satisfied? Do they experience any issues caused by the factors?

After obtaining their responses to the first research question ('what factors do L2 learners perceive as contributing to app attrition in Duolingo?'), we reminded them of the nine factors under investigation and asked them about their perceptions. This strategy was employed to ensure each participant was questioned about all factors at least once, even if they did not mention or remember all of them during the interview.

The data were analyzed qualitatively, in alignment with the coding methods proposed by Saldaña (2009). Following Saldaña's method, we created codes and prepared general categories in the first cycle. Then, we narrowed down the transcribed data to specific themes and concepts. Thanks to this coding method, we were able to organize participants' intended meaning for analysis and summarize the common factors across the groups. These data were later organized in a spreadsheet for ease of access and analysis.

Results

Quantitative Results: Survey Analysis

Unpaired t-tests were run to answer RQ1 (What factors do L2 learners perceive as contributing to app attrition in Duolingo?). Our results are discussed according to descriptive statistics based on means and standard deviations. Cronbach alphas for the survey items

(statements) were calculated to measure how closely related the items were as a group and they were found to be internally consistent (α<0.80).

Survey data on participants' perceptions about the factors gathered using Likert-scales (Agree=1.00-3.50 and Disagree=3.50-6.00) yielded mixed results, as illustrated in Table 5:

Table 5

Participants' perceptions of factors that cause app attrition in Duolingo (dropouts and active users)

Factor (App Attrition)	Dropouts		Active Users		
	Mean/6.00	SD	Mean/6.00	SD	p value
Poor instructional quality	2.50	0.66	4.63	0.53	< 0.0001
Limited learner control	3.17	0.69	3.84	0.81	< 0.0002
Learner anxiety	4.04	0.80	4.22	0.79	< 0.32
Social isolation	2.14	0.71	2.63	0.83	< 0.007
Reduced motivation	3.33	0.96	5.04	0.82	< 0.0001
Technical issues	5.14	0.34	5.23	0.43	< 0.31
Inauthenticity (of content)	2.41	0.82	3.57	0.75	< 0.0001
Being unsuccessful	5.19	0.55	5.27	0.47	< 0.49
Lack of guidance	1.96	0.98	2.02	1.06	< 0.80

Note. Perceived as contributing=1.00-3.50; perceived as not contributing=3.50-6.00

These results suggest that both active users and dropouts agreed that several factors caused app attrition in Duolingo. For dropouts, they were: lack of guidance (mean=1.88), social isolation (mean=2.14), inauthenticity (mean=2.41), poor instruction quality (mean=2.50), limited learner control (mean=3.17), and reduced motivation (mean=3.33); while for active users, they were lack of guidance (mean=1.94) and social isolation (mean=2.63).

Regarding the second RQ, which investigated which of the nine factors were more likely to cause dropout from Duolingo, we first analyzed the frequency and percentage of the factors that resulted in dropout in our participant pool. A frequency count of the multiple-choice question results showed that common reasons for dropouts (n=35) were: inauthenticity (74.3%), poor instruction quality (65.7%), reduced motivation (62.9%), lack of guidance (42.9%),

limited learner control (40%), social isolation (28.6%), being unsuccessful (14.3%), learner anxiety (5.7%), and technical issues (2.9%) among the dropouts group. Figure 4 illustrates the frequency count of all responses across the participant pool:

Figure 4

Frequency of Participant Responses to the Multiple-Choice Question
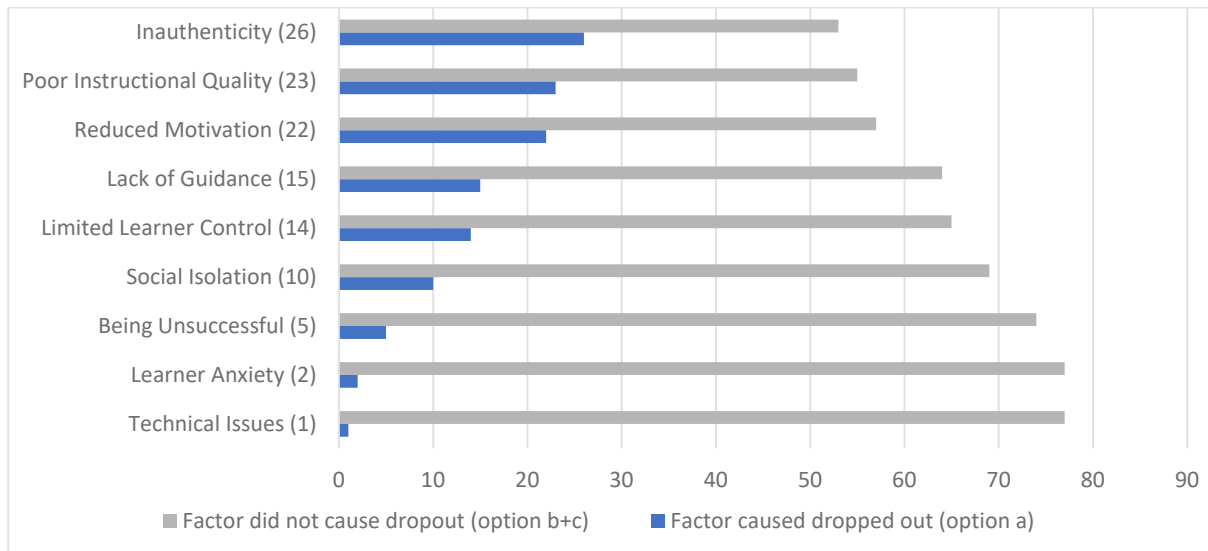
Note. Figures in brackets indicate frequency count of dropouts (who selected option a)

Based on these responses, we were able to sort participants into two data pools for nine factors (dropped out/did not dropout). We then ran another set of unpaired t-tests to compare the perceptions of these two groups formed under each factor, to get an understanding of the likelihood of the factors to cause dropout from Duolingo.

The results of the independent t-tests run between Group$_1$ ('Dropped out', i.e., users who selected option a for each factor) and Group$_2$ ('Remained', users who selected option b or c for each factor) showed that the groups were statistically different for the following factors: poor quality of instruction ($p < .0001$), inauthenticity ($p < 0.0001$), reduced motivation ($p < 0.0001$), limited learner control ($p < 0.01$), and lack of guidance ($p < 0.05$); and no different for social isolation ($p=0.92$), and success ($p=0.46$). For technical issues and learner anxiety, our study did not yield enough data for statistical analysis; very few participants claimed to have dropped out

due to these factors, thus, forming dropout groups for statistical analysis was not possible.

Figure 5, below, illustrates the statistical difference between Group$_1$ and Group$_2$ for each factor:

Figure 5

Likelihood of factors to cause dropout
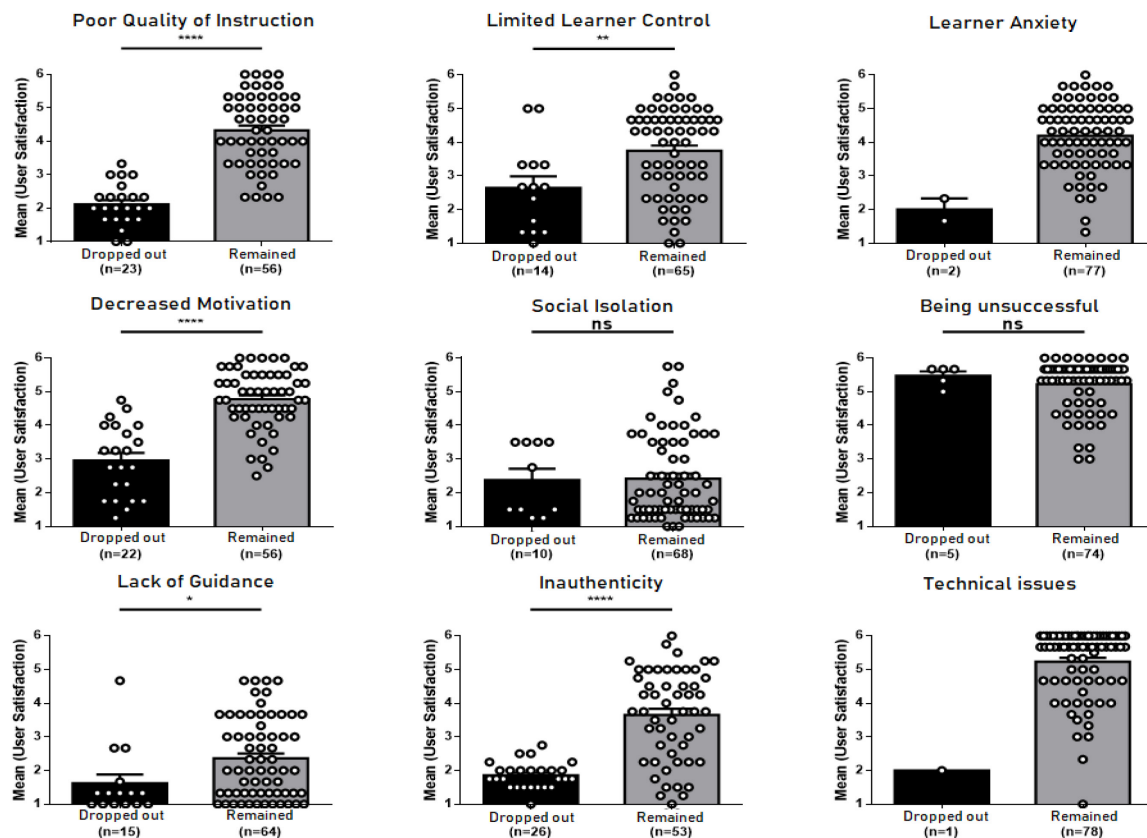
Note. Significance values are shown as: **** (p<0.0001); *** (p<0.001); ** (p<0.01); * (p<0.05); ns (p>0.05). Mean ± SD. Individual data points are displayed.

These results on users' perceptions indicate that, among the nine factors considered in this study, the factors that are more likely to cause app attrition in the context of Duolingo are poor quality of instruction, inauthenticity, reduced motivation, limited learner control, and lack of guidance, respectively. Social isolation and lack of success yielded no statistical difference; in other words, according to participant responses, they were less likely to drop out due to these factors.

Qualitative Results: Interview Analysis

Participants were asked general and specific questions (considering each factor) about their experience with Duolingo. The full interview transcriptions can be seen in Appendix D.

Firstly, the majority of participants (Dropout=3/4, Active Users=3/4) view motivation to be the leading factor for attrition. Participants' motivations usually fluctuate, indicating that they often feel bored or tired. When asked about possible reasons, they responded that their motivation depends on a set of factors such as the demands of their daily lives (e.g., *We all lead busy lives and sometimes it just so happens that I forget to open Duolingo*), difficulty with some of the proposed learning activities (e.g., *Absolutely. Sometimes, there are very difficult topics and they demotivate me. I get them eventually, but they occasionally make me call it a day, especially if I fail a few times*), and certain features of the app (e.g., *It is like my child, I am trying to grow it. I think about it all the time. When there is a sequence [daily streak] you never forget to open it. But when you lose it, it demotivates you.*). Some participants seemed to take the daily streak (a Duolingo feature) so seriously that they grew an emotional bond with the feature; and when they lost it, they felt demotivated to go back to the app. This was especially interesting because the daily streak is a tool to help motivation in Duolingo: therefore, while it worked well for many participants to get motivated, for some it had the opposite effect.

Secondly, most interviewees (Dropouts=4/4, Active users=1/4) also viewed inauthenticity as another major factor for app attrition (e.g., *[T]he sentences, sometimes they get really non-sensical, like 'the goat is drinking the milk' or 'my nephew is eating the blue orange'*). Overall, participants found it hard to interact with the automatized components of the app (e.g., *When you hear the words, it was not like when you heard them from real people. It was a robotic voice*) and emphasized that they found the sentences unnatural (e.g., *All I saw was 'the frog drank milk' or 'my grandmother hugged the yellow lion with a green hat'*).

Moreover, participants had the impression that they were not able to communicate in real life conversations due to the inauthenticity of content (e.g., *I realized that I was repeating only a few phrases I learned from Duolingo. […] I was like a robot, or a parrot, to be precise.*)

Thirdly, poor instruction quality was also mentioned as a factor for app attrition by the interviewees (Dropouts=4/4, Active users=1/4). While some participants criticized Duolingo's method for being incompatible with their learning style (e.g., *The textbook-kind of language learning is not for me, I am a social learner)*, others criticized the method for not having adequate textbook-style information and materials, as they had to refer to external sources to obtain knowledge about the subjects (e.g., *I look up grammar rules on the internet, I search for it. I do not find Duolingo courses adequate*). Users also mentioned that Duolingo's method seemed haphazard (e.g., *I think it does not have a solid instruction way. In my opinion, it just gives you some sentences to translate, pinch in some different settings […] and expects you to learn as you translate these sentences. But I don't find this way, this method systematic. They look like random to me*).

Fourthly, social isolation was also noted as a contributor for app attrition by some of the participants (n=3/8), which is summarized in the following statement: *'I feel that I need human contact when I study a new language. Duolingo was not social enough for me'.* They perceived learning a language in Duolingo as an act of disconnection from the people, performed in isolation (e.g., *I felt like I was getting disconnected from people, like I was the only English learner in a room full of foreign people*). When they were asked about the social side of Duolingo, most participants were either against (e.g., *not at all. I do not use those things)* or unaware of the social features offered by Duolingo (e.g., *I didn't know that was an option. I never interacted with anyone in Duolingo*). It should be noted that very few participants used or had any knowledge of the social opportunities available on Duolingo.

Limited learner control (n=3/8) was another factor for app attrition according to the participants, which was heavily associated with Duolingo's rigid skill tree. Participants mentioned that the fact that some topics were locked, although they felt prepared to tackle them, was an important issue (e.g., *I feel like studying another subject, but I cannot change it because it is locked. You have no control over it*). On the other hand, it should also be noted that many others supported this feature and the necessity for certain advanced subjects to be locked (e.g., […] *because I am obviously not ready to go to those places. If I have not proceeded to those levels, there is no point to be able go to there*).

To conclude, reduced motivation, inauthenticity (e.g., robotic voice, machine-generated sentences), poor instructional quality, social isolation, and learner control emerged in interviews to be the common factors for app attrition in Duolingo. However, participants also mentioned: learner anxiety (n=2), as they felt anxious to complete some exercises under time pressure and to know that others could see their progress in Duolingo; technical issues (n=1), as they experienced issues with Duolingo's automatic voice recognition; lack of guidance (n=1), as they needed more explanations and feedback about certain subjects. Table 6 shows the general responses of the participants when they were asked about what could lead to attrition in Duolingo:

Table 6

Participant responses in the interview (what causes app attrition in Duolingo?)

Dropout	Participant G	**Reduced motivation** (getting bored), **poor instructional quality** (incompatible/bad method), **inauthenticity** (speaking unnaturally like a robot or a parrot), **social isolation** (getting disconnected from people), **limited learner control**.
	Participant Y	**Reduced motivation**, **inauthenticity** (robotic voice and unintelligible content), **poor instructional quality** (incompatible/textbook-style method), **social isolation** (lack of social interaction).
	Participant A	**Reduced motivation** (getting bored, losing streak), **poor instructional quality** (method not systematic, random topics, lack of a solid instruction), **inauthenticity** (non-sensical sentences), **social isolation** (lack of human interaction).
	Participant S	**Inauthenticity** (machine generated voice and sentences), **poor instructional quality** (incompatible/bad method)
Active	Participant V	**Reduced motivation** (feeling tired, failing daily streak), **poor quality of instruction** (not enough learning materials, lack of textbook-style information).
	Participant J	**Technical issues** (problems with automatic voice recognition), **reduced motivation**, **learner anxiety** (when using Duolingo exercises with timers), **limited learner control** (fixed skill tree, locked topics).
	Participant B	**Inauthenticity** (useless, non-sensical sentences), **lack of guidance** (lack of explanations and feedback).
	Participant C	**Learner anxiety** (knowing others can see your progress, too many notifications), **limited learner control** (forced path of progression), **reduced motivation** (difficult topics, demands of life).

Discussion

The purpose of this study was to investigate the factors that contribute to app attrition in the context of Turkish (L1) Duolingo users learning English as a Foreign Language (EFL). Our study aimed to determine and examine contributing factors, based on data gathered from both dropouts and active users of Duolingo.

According to our quantitative analysis, six factors (i.e., poor instruction quality, reduced motivation, inauthenticity, limited learner control, lack of guidance, and social isolation) were perceived to be contributing to app attrition in Duolingo, while factors such as being unsuccessful, learner anxiety and technical issues were not. In this regard, the results of our study seem to contradict those of Wesely (2010), who considered lack of success as one of the

factors that contributed to attrition in foreign language programs. In fact, neither group perceived lack of success (dropouts=5.19/6; active users=5.27/6) as a factor for app attrition. The observed high rate for both groups can be explained by the fact that Duolingo provides a gamified learning environment in which participants are not afraid to make mistakes—as in any game, mistakes are integral to the learning experience. This was confirmed in the interview, in which participants reported that they did not 'take making mistakes in Duolingo seriously'.

Our quantitative analysis also accounted for the likelihood of factors to cause dropout; that is, poor quality of instruction, reduced motivation, inauthenticity, limited learner control, and lack of guidance were more likely to contribute to dropping out, as compared to lack of success and social isolation. Our study did not yield enough data to account for the likelihood of two factors (technical issues and anxiety), as very few participants in our pool claimed to have dropped out of Duolingo due to those factors.

On the other hand, our qualitative analysis provided further explanation on how Duolingo users react to the factors assumed/hypothesized to contribute to app attrition. Both dropouts and active users agreed that staying motivated was a challenge to overcome in Duolingo, which appeared to confirm the findings of Garcia-Botero and Questier (2016). Participants expressed that their motivation fluctuates, and that they might lose interest in the app due to a variety of internal and external reasons. These reasons include, but are not limited to, the demands of their daily lives, poor time management, forgetfulness and laziness, difficulty with some of the proposed learning activities, and losing their daily streak record.

Poor instructional quality was another common factor, especially among dropouts, who criticized Duolingo for being too textbook-like and incompatible with their learning style. These users found interacting with and learning from Duolingo to be boring, which appeared to be consistent with Bidlake's (2009) remarks that some apps "only replaced 'boring

memorization' and 'the endless tedium of grammar drills' with boring multiple choice questions and the endless tedium of mouse-clicking' (p.163).

In addition, some participants expressed that the content of Duolingo felt inauthentic, (unnatural), occasionally unintelligible, and not very helpful in real-life situations. This seemed to corroborate the criticisms by Garcia (2013), who observed that Duolingo cannot be effective until it introduces sophisticated pronunciation lessons and venues for native-to-learner interaction. These participants defined themselves as 'social learners' and strictly advocated that they must interact with real people to learn and remain engaged. They also complained about being disconnected and socially isolated when using Duolingo, which is parallel to the findings of Guarnieri (2015) about the hardships students encounter in online language learning programs. It should also be noted, however, that most interviewees in our study were unaware of the many existing social opportunities provided in Duolingo.

Conclusion

CALL is an alternative way of learning that has many advantages (Cardoso et al., 2015; Liakin et al., 2015, 2017; Payne & Whitney, 2002; Seferoğlu, 2005) and disadvantages (Krashen, 2014). Various studies on the effectiveness of CALL applications reported high dropout rates as a common finding (Garcia-Botero & Questier, 2016; Guarnieri, 2015; Nielson, 2011). This observation guided our investigating on what factors contribute to app attrition, the process that leads language learners to abandon the app due to a number of internal and external factors covered by our study.

On the factors that contribute to app attrition among Turkish users of Duolingo learning English as a foreign language, our findings revealed that poor instructional quality, inauthenticity of the content, reduced motivation, learner control, lack of guidance and social isolation were perceived as contributing factors to app attrition.

Furthermore, our study also analyzed the likelihood of factors to cause dropout in the case of Duolingo since multiple factors can cause app attrition although not all of them trigger the decision to drop out. As noted in the interviews, our study showed that users may consciously or unconsciously develop coping mechanisms (or strategies) to persist against the challenges they face in Duolingo or simply choose to ignore them. Therefore, perceiving the factors or experiencing issues with regards to them does not necessarily mean that users drop out of the app because of them. To understand and account for this complex relation, we analyzed the likelihood of the factors to cause dropout from Duolingo. Our results indicate that some factors are more likely than others to trigger the decision to drop out.

Our study reveals that users who experience issues about quality of instruction (overall quality of learning objectives, curriculum, features provided, and compatibility of Duolingo's method with the learner), motivation (how the app and certain features helps with their motivation), or authenticity (how natural and comprehensible users find the content in Duolingo, including the voice, texts and all means of communication) are more likely to drop out. They are also likely to drop out if they experience issues about learner control (the freedom to customize Duolingo and its features, and choose what to study in the app) or guidance (the instructions on the exercises, tips and feedback on subjects, and how they are guided throughout the app). On the other hand, they are less likely or not likely at all to drop out if they experience social problems (social isolation, being disconnected from a learner group, lack of opportunities to connect with others) or lack of success (failing in exercises, making mistakes). Unfortunately, our study did not have enough data to calculate learner anxiety or technical issues, as our participant pool had very few dropouts who claimed to have abandoned Duolingo due to these factors.

Another limitation of our study was that it targeted both self-regulated users who use/used Duolingo on their own and those who use/used Duolingo with the help of a teacher or as a complementary tool to other apps or courses. It is possible that in different learning settings, users have different perceptions of the app and factors that contribute to app attrition.

Furthermore, our study relied solely on the responses of participants for determining participants' proficiency level. Unfortunately, due to the nature of our study (i.e., an online survey), it did not have the resources to implement a separate proficiency test to participants, which would have been more accurate to identify the proficiency status of the participants and reflect on them.

Lastly, our participant base consisted of Turkish users only, who learned EFL in Turkey: therefore, it is possible that other users in different cultures or studying different languages might yield different data and results. However, anecdotal evidence that is based on personal experience and observations from interviews suggest that the findings of our study may not be confined to the Turkish population, as our subject matter is not heavily culture- or language-specific. Duolingo is an app that offers free courses for a wide variety of languages, English for Turkish learners being one. Although the study focused on Duolingo, we believe that our findings can be generalized to other populations, languages, and possibly similar learning apps.

Chapter Three

Many studies conducted in the field of CALL revealed high dropout rates as a common finding (e.g., Garcia-Botero & Questier, 2016; Guarnieri, 2015; Nielson, 2011). In an attempt to account for this fact, our study pinpointed possible factors behind app attrition, which we describe as the process that leads language learners to abandon a CALL application. Our study identified nine possible factors behind app attrition, based on the literature on foreign/second language learning. Focusing on one of the language learning apps, Duolingo, our study gauged the perceptions of 79 Turkish Duolingo users who learn English as a foreign language about the factors that contribute to app attrition. Further, our study investigated how likely the factors were to cause dropout from Duolingo for the participants.

Adopting a mixed-methods approach, our study surveyed and interviewed the participants, who were active or former users (dropouts) of Duolingo. Quantitative results indicated that six factors contributed to app attrition (lack of guidance, social isolation, inauthenticity, poor instruction quality, limited learner control, and reduced motivation) in the case of Turkish users learning English with Duolingo. Our results also revealed that five of them (lack of guidance, inauthenticity, poor instruction quality, limited learner control, and reduced motivation) were perceived as more likely to cause dropout than the rest, with two factors (technical issues and learner anxiety) yielding insufficient data across our participant pool to make a likelihood analysis. Our qualitative analysis was also parallel with these results, which gave further insight about how users perceived the factors for app attrition.

This chapter explores the pedagogical implications of the findings observed in Chapter 2, above, and how they relate to self-regulated learning and CALL materials development. Furthermore, it includes a brief discussion about the limitations of our study and future directions for academic research.

Pedagogical Implications

In light of the data collected from Turkish users of Duolingo who studied English language on the smartphone and computer editions of Duolingo, our study drew certain conclusions about the factors that contribute to app attrition. We believe that our study might benefit a wide range of 'stakeholders', including self-learners, teachers, scholars and software developers.

Duolingo is a very dynamic app that gets updated frequently; therefore, our results may be valid for a limited time, applying to Duolingo versions that were available to the date of data collection. Some of the new features that were launched after our study might already be dealing with the factors differently, possibly in a better way. Nevertheless, we encourage developers to evaluate our findings to further improve Duolingo and develop new features or tools to mitigate the disruptive effects of these factors.

Based on our findings, it is recommended that Duolingo users are provided additional venues or settings to improve their overall control over the app as they tend to drop out when there they are limited. Developers should consider adding more features, especially advanced ones, who want to customize the app to their own liking and access more content. A special mode for more advanced users, which would grant immediate access to certain locked topics and specific types of exercises (e.g., speaking exercises, listening exercises), would be a useful addition to give users more control, especially if/when they believe their proficiency level was not precisely determined by Duolingo.

Developers should also consider that users tend to drop out of Duolingo when their individual learning styles do not align well with the pedagogy and exercises provided by Duolingo. To prevent this tendency, developers could add a feature that would allow advanced users to select their learning style, which would tailor the instruction in a more textbook-style

fashion (with more grammar drills, textbook-like information, readings and relevant exercises) or in a more social fashion (with more speaking and listening exercises; and less texts and reading materials).

In addition, as our participants reported that they struggled with issues of disconnectedness (social isolation) and inauthenticity of content, we believe that add-on features to integrate native speakers into the learning environment could also be a good way to ensure learners are adequately exposed to natural language situations and native-to-learner interaction.

On the other hand, self-learners of Duolingo could also benefit from our results. It is recommended that learners complement Duolingo with other internet sources and platforms. They can visit additional grammar websites when they need more information about subjects. They can visit language websites (native-to-learner matchmaking sites) when they need communicative interaction. We would encourage them to visit Duolingo discussion forums and Duolingo events more often. We would also encourage teachers to integrate apps like Duolingo into their classrooms as a complementary tool, where the disruptive effects of factors such as social isolation, lack of guidance, and poor instructional quality would be most likely be diminished or completely eliminated.

Future Research and Concluding Remarks

For future research, scholars are invited to contribute to the concept of app attrition and the factors we have considered in our study. As this study aimed to coin and describe app attrition for the first time, the concept is worth exploring by other scholars to find the limitations and gaps our study failed to address. In this section, we list some of the limitations of our study.

Our study is based on one particular app (Duolingo), with participants from one particular country (Turkey). Reproducing the study for other cultures or other apps would determine

whether our assumptions and results are reproducible and/or generalizable. For example, while some features of Duolingo are similar to those of other language learning apps, there are a plethora of apps with various features and properties. Most factors are directly related to the characteristic properties of each app and, consequently, these will vary from one app to another. Also, what might be valid for Turkish users might well be invalid for users from another culture.

Future research could explore the app's (or other apps') use in a regular language classroom so that one could examine app attrition in a different learning environment. Furthermore, analyzing user feedback from a larger population could provide more sophisticated data on how users perceive the factors we have examined and how likely they are to drop out. Age effects on app attrition could also be another potential avenue for research.

We conclude that app attrition is a topic that is worthy of examination in the future, in order to address how to cope with or mitigate the high rates of dropout from language learning apps. Apps like Duolingo have a bright future and have been developing at a very fast pace, giving millions of learners worldwide a quite sophisticated and accessible second or foreign language education for free. Although these apps face numerous challenges ahead before they can become standalone venues for language learning, they keep improving bit by bit, with the addition of new tools and possibilities for language learning. Duolingo developers have already improved many aspects of the app to a great extent in the past few years, and it keeps on getting better. With time and more publicity about new tools and features, there is no reason apps like Duolingo cannot come up with new ways to increase user retention and help users worldwide to learn and master a foreign language "anytime and anywhere" for free.

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Appendices

Appendix A: Demographic Survey

1. Have you ever used **Duolingo**?

Yes (__) No (__)

2. Are you still using **Duolingo**?

Yes (__) No (__)

3. What is your country of residence?

Turkey (__) Other (__)

Demographic Information

4. Full Name   : _____

5. Age   : _____

6. Gender   : Male (__) Female (__) Other (__)

7. Native Language   : Turkish (__) Other (Please indicate: _____)

8. Nationality   : Turkish (__) Other (Please indicate: _____)

9. Education level   : High School (__) Undergraduate (__) Graduate or above (__)

10. What is your English proficiency level **according to your own estimation:**

Writing   Beginner (__) Intermediate (__) Upper-intermediate (__) Advanced (__)

Listening   Beginner (__) Intermediate (__) Upper-intermediate (__) Advanced (__)

Speaking   Beginner (__) Intermediate (__) Upper-intermediate (__) Advanced (__)

Reading   Beginner (__) Intermediate (__) Upper-intermediate (__) Advanced (__)

Vocabulary   Beginner (__) Intermediate (__) Upper-intermediate (__) Advanced (__)

Overall   Beginner (__) Intermediate (__) Upper-intermediate (__) Advanced (__)

11. What is the average amount of hours you spend using Duolingo **per week**?

0-1 hour (__) 1-2 hours (__) 2-6 hours (__) 6+ hours (__) I do not use Duolingo anymore (__)

12. **On which devices** do you use Duolingo? Please choose all that you use:

Mobile Device (__) Computer (__) Tablet (__) Other (Please specify: _____)

Appendix B: The Study Survey

Please indicate how likely you are to agree or disagree with each statement below:

1) **Quality of Instruction:**

Statement	Completely Disagree	Disagree	Somehow Disagree	Somehow Agree	Agree	Completely Agree
1- It is possible to learn English with **Duolingo**.	1	2	3	4	5	6
2- I like the **quality of instruction (method)** in Duolingo**.**	1	2	3	4	5	6
3- Duolingo has **all the features I need** for learning English.	1	2	3	4	5	6

4- Considering the overall instructional quality in Duolingo:

    a.   Instructional quality in Duolingo caused me to drop out of the app.

    b.   Instructional quality in Duolingo can cause dropout from the app.

    c.   Instructional quality in Duolingo does not/did not cause dropout.

2) **Learner Control:**

5- Duolingo gives me enough freedom to	1	2	3	4	5	6

	Completely Disagree	Disagree	Somehow Disagree	Somehow Agree	Agree	Completely Agree
customize how I learn **English.**						
6- Duolingo gives me enough freedom to **choose what to study**.	1	2	3	4	5	6
7- Duolingo limits **what I study in the app**.	1	2	3	4	5	6

8- Considering the overall learner control in Duolingo:

    a. Learner control issues caused me to drop out of the app.

    b. Learner control issues can cause dropout from the app.

    c. Learner control issues does not/did not cause dropout.

3) Anxiety:

Statement	Completely Disagree	Disagree	Somehow Disagree	Somehow Agree	Agree	Completely Agree
9- I **feel anxious** learning a language in Duolingo.	1	2	3	4	5	6
10- **I feel anxious** when I practice with other learners in Duolingo.	1	2	3	4	5	6

11- **I feel anxious** to know that others can see my progress in Duolingo**.**	1	2	3	4	5	6

12- Considering my overall anxiety in Duolingo:

    a.   Anxiety issues caused me to drop out of the app.

    b.   Anxiety issues can cause dropout from the app.

    c.   Anxiety issues does not/did not cause dropout.

4) Motivation:

Statement	Completely Disagree	Disagree	Somehow Disagree	Somehow Agree	Agree	Completely Agree
13- I feel **motivated** to learn English with Duolingo.	1	2	3	4	5	6
14- The **app notifications** adequately motivate me to use Duolingo.	1	2	3	4	5	6
15- The **daily streak indicator motivates me** to use Duolingo.	1	2	3	4	5	6
16- I lose my **motivation** when using Duolingo.	1	2	3	4	5	6

17- Considering my overall motivation in Duolingo:

    a. Motivation issues in Duolingo caused me to drop out of the app.

    b. Motivation issues in Duolingo can cause dropout from the app.

    c. Motivation issues do not/did not cause dropout.

5) Social isolation:

18- I can **socialize with other learners in Duolingo.**	1	2	3	4	5	6
19- I can **communicate with others** in Duolingo.	1	2	3	4	5	6
20- **Social opportunities in Duolingo** keeps me attached to a community.	1	2	3	4	5	6
21- I feel **socially isolated** in Duolingo.	1	2	3	4	5	6

22- Considering the sociality in Duolingo:

    a. Social isolation caused me to drop out of the app.

    b. Social isolation can cause dropout from the app.

    c. Social isolation does not/did not cause dropout.

6) Success:

23- I **feel successful** in Duolingo.	1	2	3	4	5	6
24- I **feel successful** when I am on a **daily streak** in Duolingo.	1	2	3	4	5	6
25- I **feel successful** when I **complete a unit** in Duolingo.	1	2	3	4	5	6

26- Considering my overall success in Duolingo:

    a.   Being unsuccessful in Duolingo caused me to drop out of the app.

    b.   Being unsuccessful in Duolingo can cause dropout from the app.

    c.   Being unsuccessful in Duolingo does not/did not cause dropout.

7) Guidance in Duolingo:

27- I think Duolingo provides enough **guidance about the exercises**.	1	2	3	4	5	6
28- I need a supervisor **to guide me in Duolingo**.	1	2	3	4	5	6

29- I need a teacher **to guide my progression in Duolingo**.	1	2	3	4	5	6

30- Considering the overall guidance in Duolingo:

    a.   Lack of guidance caused me to drop out of the app.

    b.   Lack of guidance can cause dropout from the app.

    c.   Lack of guidance does not/did not cause dropout.

8) Authenticity:

31- I like **the voice that reads the words aloud** in Duolingo.	1	2	3	4	5	6
32- I have difficulty in **understanding the voice and sentences** in Duolingo.	1	2	3	4	5	6
33- I believe that **the voice pronounces the words perfectly.**	1	2	3	4	5	6

34- The sentences in Duolingo exercises **feel natural.**	1	2	3	4	5	6

35- Considering the authenticity of all content (text & voice) in Duolingo:

    a. Inauthenticity of Duolingo caused me to decide to drop out of the app.

    b. Inauthenticity of Duolingo can cause dropout from the app.

    c. Inauthenticity of Duolingo does not/did not cause dropout.

9) Technical Issues:

36- Duolingo **freezes/ crashes** while I am studying.	1	2	3	4	5	6
37- I **lost my progress in Duolingo** due to technical problems.	1	2	3	4	5	6
38- Some components (mouse, keyboard, touch screen etc.) **fail while using Duolingo**.	1	2	3	4	5	6

39- Considering the technical qualities of Duolingo:

    a. Technical issues in Duolingo caused me to drop out of the app.

b. Technical issues in Duolingo can cause dropout from the app.

c. Technical issues in Duolingo do not/did not cause dropout.

Appendix C: Semi-structured Interview Questions

1. Do you think it is possible **to learn a language** through Duolingo?

2. Have you ever given a break (more than a month) or **stopped using Duolingo**? Why?

      If no:

      - What are the features that you dislike most about Duolingo?

      If yes:

      - Why did you give a break/dropped out?

      - Were you using the social features of the app before dropping out?

      - Did you think it was becoming less effective?

6. What do you think about the **reminders and notifications** that Duolingo uses?

7. What do you think about the **hot streak and experience indicators** in Duolingo?

8. What do you think about Duolingo's **assessment** of language skills? Do you think Duolingo represents your actual language skills?

9. Do you feel a sense of **success** when you complete the tasks?

10. Do you feel more **anxious** when communicating with peers in Duolingo as compared to communicating with classmates in traditional classroom-type settings?

Appendix D: Interview Transcriptions

Interview with Y

(Intermediate, Dropout, used Duolingo for 3 months)

Skype Video Call – Conducted on June 7th, 10:30 AM

TRANSLATED TO ENGLISH

H: Hi Y, is my voice straight?

Y: Hello, Haluk. Yes, I can hear you perfectly.

H: Good! How are you? Thanks for accepting this interview.

Y: Yeah, no problem, I hope I can help you. I haven't used Duolingo for a very long period.

H: That's alright! Actually, that's what I am looking for if you saw it on the consent form. I am specifically investigating why people abandon Duolingo.

Y: Oh yes, [laughs] I know, right.

H: Alright, let us start then. So, you've read and signed the consent form, is there any questions you have before we start?

Y: No, everything is clear. We can start now.

H: Okay, first of all, how long have or had you been using Duolingo?

Y: I had used Duolingo for three months before I quit it.

H: Three months, good. How many hours do you think you were using it per week? If it's easier you can reply in hours per day.

Y: I'm not sure. [Pauses] But, I can say I used it at least an hour a day. I had these reminders [laughs] you know.

H: Perfect, we'll get to the reminders, too! Which language, may I ask?

Y: English.

H: What factors do you think contributed to your decision to leave the app. For example, have you ever experienced anything bad or unsatisfying in Duolingo before you left the app?

Y: In my case, I found the list of goals (participant means the 'skills') too long. I mean, these goals are like chapters and they seemed to be going on forever. I felt like 'oh my god, do I have to finish all these to speak English' and had the impression that I would never complete all of them. I think this is the first thing that demotivated me.

H: Interesting, what other things or factors do you think are there? Was this the only or the biggest reason?

Y: No, this is just one of them. The reason I started using Duolingo was to learn a new language. However, I did not see any progress during the time I used Duolingo. Maybe it was because of me, I do not know. You as experts would probably know better but I could not get any success [participant means successfully learning English, not being successful in Duolingo]. I mean, if it's not possible to learn English by studying 1 hour a day, then it is probably not my fault [laughs] but, yeah, I think at least half of the blame is on Duolingo! For example, the sentences being too robotic, and funny sentences that do not make sense… You know it's the computer that brings those words together! I would not reproduce those things in a conversation. If I had seen things that I really wanted to learn in English, maybe I would have spent more time. All I saw was 'the frog drank milk' or 'my grandmother hugged the yellow lion with a green hat' [laughs]. I am exaggerating a little here but you understand. After a while, I was only opening the app to finish the assigned goals. You are only spending time there with English words, but not really learning to speak. Maybe your conscience is like 'yeah, I'm studying English! For an hour!' but to what extent? Is that hour well-spent, or how efficient? All these things demotivate me.

H: I understand. So you believe that all these factors reduce your motivation.

Y: Yes.

H: Okay. So if you were to list these factors, you would say…

Y: The list of goals being very long and scary, the irrelevant words and information that do not make sense, and [pauses].

H: You had said 'the robotic voice'.

Y: Yes, the robotic voice. I mean, I want to talk to somebody, I want to speak English. I do not want to study in writing only. I want to interact with a human being, this is closer to my learning style. The style of duolingo is not for people like me. Those voices are like a computer reading a bunch of random words. I cannot interact with that voice even though it prompts me to speak or say things aloud. Repeating things aloud and speaking are different. That's why, it did not contribute to my learning process. That's the third factor.

H: What is your language level?

Y: I can say intermediate.

H: Do you think you would appreciate Duolingo if you were a beginner?

Y: [Pauses and thinks] Yes. I mean, absolutely! It is a very nice way to learn English in the beginning.

H: Alright. Let us move to another subject: Learner control. How do you feel about learner control in Duolingo? Do you think you can manage and adjust things on your own, can you control the learning process? Was this relevant in your decision to drop out?

Y: In fact, no. I mean, there is a more or less predetermined curriculum. If you made a little progress you a pool of items to study, and you can choose which to study next. That's why, I don't think it is limiting. I don't think it is a bad thing that it tells me what subject to study.

H: I understand. How about the guidance? Do you think Duolingo is as good as a human teacher in guiding you?

Y: No, it is not. But I don't think that this is important. In our day, self-learning has hit the roof. It is very common, everyone is learning things on their own. Language learning is all the same. There have always been these books and language learning sets for self-study. I do not mean to comment on whether they are successful or not, but I am just saying that they existed since forever. That's why, I don't think that a guide has to be there. People can learn a language on their own.

H: I understand. What else?

Y: The quality of instruction was absolutely dissatisfactory, and it had a great impact on my demotivation [decision]. Also, what do you mean by the quality? What I understand from quality is that, you know, the content being very informing and well-thought, not repetitive or boring. The content being parallel with my learning style. I wasn't happy with none of these.

H: Did this have an impact on your decision to dropout?

Y: Absolutely, yes.

H: How about quality of the app, sorry I mean the app stability. Did you have any freezes, or to put it more general, were you happy with how stabile Duolingo was?

Y: It was quite stabile. I mean, I cannot say for sure, but I don't remember any problems or freezes. I only used the app for 3 months, though.

H: And then you deleted it?

Y: It stayed on my phone for a while after I stopped using it. Then one day, while I was clearing my phone and unused apps, I deleted Duolingo, too. Along with other apps.

H: Great, well, these were all my questions. Thank you for your time. Do you have anything you would like to add? Let me summarize what I took down so far. You can interrupt me any time. You told about your demotivation process and the factors that contributed to it. You said that your learning style was social and interactive, that you wanted to talk to a real person

rather than a robot, and that Duolingo did not meet your learning needs in this perspective. You don't think there is quality instruction in Duolingo, but on the other hand, you also think that the need to be guided or to control the learning process were not relevant in your decision to drop out from the app. You did not encounter app stability issues at all. And, yes. Is there anything else you want to add?

Y: Actually, no. [laughs] You summarized it great.

H: Last question then. Among all these factors, what was the most critical one for you?

Y: For me, it was the lack of human interaction.

H: I see. Thank you very much for joining me for this skype call. Our interview is over.

Interview with C

(Beginner, Active, used Duolingo for 2+ years)

Skype Video Call – Conducted on August 11th, 10:30 AM

TRANSLATED TO ENGLISH

H: Hello C, how are you?

C: Hi, I'm fine. And you?

H: I am great! So, thanks for accepting my interview.

C: Yeah, no problem! A pleasure.

H: It is very nice to have the comments of an experienced users of Duolingo, just like yourself. So, you've read and signed the consent form, this recording is only for my convenience to transcribe. It will be destroyed afterwards as I mentioned. Is there any questions you have before we start?

C: No, we can start.

H: Okay, you can always ask me whenever you have questions about anything. First, how long have you been using Duolingo?

C: I started using Duolingo two years ago when I was at college, during the summer holiday. I use it seasonally. I mean I use it only in summer holidays because when the term starts, I do not have time to spare for it. So in total I must have used it for 5-6 months.

H: I see. Within these 5-6 months, how many hours do you think you spend on it per week or per day? Of course, I am asking the average when you are actively using Duolingo.

C: Hard to say. It changes from 5 minutes to half an hour or a bit more. But per week, I guess that would be 4-5 hours.

H: That's good, are you currently an active user of Duolingo as we speak?

C: Yes, I am using it actively.

H: Okay, perfect. Now, you know my thesis is about why people abandon Duolingo, in particular. Like why do people start and leave it without accomplishing their goal? What is in the way, do they get bored or is there anything wrong with the app or the learning process etc. I am interested in any reason that is in the way. Now, you said 'seasonally', which really raised my eyebrow. You use it for a season and then do not really visit the app again, I assume?

C: Yes. I use it when I am on holiday because there is not much to do here and I have plenty of time. But in Eskisehir, where my university is, I have to focus on my courses and I also work part time so I scarcely open it, if I ever do. But I usually delete the app. You see, I have a lot of friends who use Duolingo as well, it sends a ton of notifications, which I believe could be a reason for some people to stay away from it. If you stop or decide to go easy for a while, the notifications will be all over you. It says 'your daily something will end'…

H: The daily streak.

C: Yeah, it reminds you a lot about the streak. It gives you the feeling that you are falling behind where your friends proceed, too. Some people, for example, think, or go into a kind of competition without intending to do so. And they get away from the app because they only want to improve their English, not to compete with their friends maybe! And everyone learns at a different pace, sometimes you spend hours and do not learn anything while some others might perform differently. So, when you go into a competition like this, I believe some people tend to delete the app. I have some friends who left Duolingo this way because they did not want this interaction. They feel anxious and get demoralized.

H: I see. Is it the case for you, too? Do you go into this type of competition with your friends, too?

C: Well, at first, I was. Very briefly. But then I concentrated on my own goals. I cannot say I feel demoralized by others' progression now.

H: I feel you. Yeah, but this is very interesting and beneficial for my study. Because usually these mechanics are usually put in these apps to create a sense of competition so people would get pumped up. But it might backfire, too as you mentioned.

C: Yes, exactly, I completely agree.

H: Okay, let me take this down to my notes. Okay, back to the notifications. You said that you experienced some disturbance with the notifications, and that it was the reason you delete the app.

C: Yes, that is right. I mean it is good that it reminds you to study. Because, in daily life you can forget to open the app, it is very normal. But when it starts getting too much, then it forces you to either mute the app or delete it. Because I think it is consuming a lot of battery power, too.

H: I understand. Draining battery! That is an interesting thing to consider, too. Do you have any other opinions based your experience?

C: I can tell you another thing. In general, when you start from the beginning to the advanced subjects, sometimes you want to skip some of them. For example, it only allows you to go to the subject you want if you pass the required ones first. I know that I am more advanced than those beginner subjects, but regardless, I have to go through them and it takes a lot of time. It forces you to remember some of the fundamental levels, but I see that as a time loss. The unlocking process can sometimes be tiresome.

H: So, you say that it is a waste of time especially if you already remember those fundamental things which you have to go through.

C: Sometimes it asks you to write a sentence, it does not ask you to type it, though, it gives you the words. Later, it may ask you to do the exact same thing again and again. This is not something major or critical though. It will not lead me to drop out from the app, but it can be frustrating at times.

H: I totally get it. Well, so far you have given me insight about a variety of factors. It looks like I won't even have to prompt you about other factors. Do you have any other issues with Duolingo?

C: Not that I can remember, no.

H: In that case, just to be on the safe side, I may walk you through some other factors and see what you think about them. I mean you already touched upon many of the factors already, so I will skip them and get to the ones you never mentioned so far. So, one of the factors, although you talked about it a little, is the quality of instruction in Duolingo. How do you find it, and do you see it as a factor?

C: I think, out of all the apps in the store, the best app, or rather, the most quality app in terms of instruction is Duolingo. That is why I downloaded it, that is why my friends downloaded it. It does not take a lot of time, 15 minutes or 30 minutes every day is not a lot to ask to learn a language. Sometimes, it may be hard to continue every day, but it is not unrealistic as a goal. I like the idea. I think it is cost-effective time-wise and quite satisfying instruction-wise. I love its method, too.

H: How about the learner control in the app? For example, you did mention about Duolingo not letting you to open certain subjects. Do you think the fact that it limits you about certain things is an issue? Could this be a factor for dropout?

C: If a person is advanced it might be a huge factor. Because imagine you are very advanced and it fails to locate your level and makes you go through very fundamental topics. But for me, it is okay for now, it's just a little frustrating.

H: I understand.

C: There is a reason for it to limit you, in the end: they are too advanced for your level, it is just not the time yet. But it demotivates me.

H: Okay, how about your motivation then? Have you ever experienced any fluctuations in your motivation that made you close the app?

C: Absolutely. Sometimes, there are very difficult topics and they demotivate me. I get them eventually, but they occasionally make me call it a day, especially if I fail a few times.

H: I see, do you believe this is an important factor for app attrition?

C: Yes, for sure.

H: Very well. How about the guidance and scaffolding in Duolingo? Do you think it gives you enough instructions or do you find it as an important factor?

C: Well, about that, [pauses] I don't know. I think it is okay. As an app, I think it gives just the right amount of directions; maybe they should put more options in the app about notifications.

H: Yes, I remember you already mentioned that in the beginning. How about the authenticity in Duolingo? Do you find the content authentic and natural?

C: Well it is a computer-based program. It is a little artificial but I do not think it is a problem. At least, it was not for me.

H: Alright, and have you ever experienced any technical issues in Duolingo? Freezes, crashes, progression losses…

C: No, I never lost my progress. No freezes, either.

H: Okay, I am not surprised. One last question, out of all the things we have discussed so far, what do you think is the most important factor for dropout based on your experience?

C: I would say motivation and forgetfulness, as we all lead busy lives and sometimes tend to forget to open an app. It is not like a real course, you would not forget to go to the course. But some days, even if you are not very busy, you do not remember to open Duolingo.

H: I understand. Well, these were all my questions. Do you have anything to add about the things we discussed?

C: No, I think that's it.

H: Okay then. Thank you for your time for the valuable inputs you provided. You can call me anytime if you have further thoughts. Thanks once again. I will stop recording here.

Interview with B

(Pre-Intermediate, Active, used Duolingo for 4+ years)

Skype Video Call – Conducted on August 12ⁿᵈ, 11:00 AM

TRANSLATED TO ENGLISH

H: First of all, thank you very much for accepting this interview. As I mentioned, it will just be a nice conversation about your feelings and experience about Duolingo. Please tell me everything as detailed as you want and remember that there are not any correct answers or wrong answers; I am only curious about what you think. Alright?

B: Yes, okay. I understand.

H: Great! How long have you been using Duolingo?

B: At least 4 years. Probably more than four years.

H: Very nice. Have you ever taken a break during these 4+ years?

B: I must have given 2-3 day breaks, during exams. [Participant is a high school teacher] But not for long, maximum one month I would say.

H: Okay, and I wonder, why did you give these breaks especially the ones that are longer than 20 days, or a month as you mentioned.

B: Due to daily life being too busy, exam periods. When I went abroad to see my daughter, I could not use it. I used Duolingo 98 days in a row once.

H: Wow! That's really amazing. How many hours per day or week? I mean, during the time you used Duolingo. You can answer in any of them. Give me a rough guess if you can?

B: On average, at least half an hour a day. Sometimes ten minutes, but sometimes 2 hours, 3 hours, even four. It depends on the day. If I have time and I have nothing to do I take my time.

H: Great, which languages do you learn in Duolingo?

B: English, only.

H: Okay. Now, have you ever stopped using Duolingo due to an experience, particularly an unpleasant one. Like, have you ever felt bad, angry, dissatisfied or uncomfortable and decided to close the app for that day?

B: No, I do not remember.

H: How about bored? Have you ever felt bored?

B: Well, I never felt extremely bored. I leave the app when I get very tired, though. But, no I did not close it due a specific incident which disturbed me or whatever.

H: Okay, I understand.

B: I am very ambitious. I am a teacher, I never give up easily. I know how hard it is learn something new.

H: Yes, totally. You are right! Are you still using Duolingo as we speak?

B: Yes, I have a 36-day-streak. Oh, no sorry. I have a 10-day streak, even though I am working very hard these days. For example, since I am very busy these days, I try to do easier subjects to fill the bar [experience bar for daily streak]. Or I go to a subject that I already completed because I do not have a lot of time. For example, there is a course that I do not like, I completed 4 chapters on that subject and the fifth one is a little difficult. In that subject I get tired, I cannot get my head together and feel distracted. It is a subject about relative pronouns. I still got to level 4 but I cannot finish the fifth one. I am waiting for that one, I want to start that with a refreshed state when I am well-rested. There are very long sentences there, and one needs to have a clear state of mind.

H: I understand, let's rewind a little, do you think the daily streak is motivating you, then?

B: Of course! Absolutely, I always think about it so I do not have to start over or miss it. Now I am going for 11-day streak, my goal is to have a 100-day streak. Once I lost it at 98 day, they told me that I could recover it. But they ask for 6 dollars so I did not pay it.

H: You said that you do not want to 'start over'. I find it interesting. You know that it is the streak that you are losing, not your real progress, right? That is still in your head!

B: Yes, of course. I know, I know. I am totally aware. But it has been 10 days now, so to speak. It is like my child, I am trying to grow it. I think about it all the time. When there is a sequence [daily streak] you never forget to open it. But when you lose it, it demotivates you.

H: Yes, I totally understand. Well, that is a very good thing that you care about the daily streak. Okay, now I am going to ask about negative sides of Duolingo, for example, your dissatisfactions about it. What are your dissatisfactions, especially from a dropout standpoint?

B: Some sentences are useless, stupid sentences. They are non-sense. You cannot use it anywhere [participant means 'in daily conversations']. Sometimes it says you are correct, and at another place, it will mark the same as a mistake. I found some mistakes, I mean. Relative pronouns, for example, are too long. I see that they want to make it more advanced or heavy but, those sentences, I cannot even understand them in Turkish. I do not even use those sentences in Turkish conversation.

H: What do you mean by too long, are you talking about the sentences themselves or the subject chapters?

B: Both, but the most problematic is when they make the chapter too long. Otherwise, yes, of course long sentences make you spend a little effort on them but they are on the screen and I can follow them even if I have to stop and think for a few seconds. But some subjects, they prolong and prolong the same thing and it makes you bored. I think they are redundant. If

they particularly use attractive [interesting] and logical [natural] sentences, it would be much better.

H: I understand. So how do you like the instruction in Duolingo, overall?

B: It is excellent, I mean, apart from these things that I mentioned, it is very good in general. At first, you find it a little boring but then, you realize your progress and that you are learning things. At first, I had to use pen and paper to level up on the courses. Now, I can keep many things on my mind and do the tasks without them.

H: How about your control over the app? Do you like the way Duolingo lets you learn things on your own? Can you customize the app based on your needs, the way you want, the subjects you want?

B: There is a decent curriculum. Let's say basic sentences, I can go back to the chapters that I completed in the past. On the other hand, there are locked places [subjects -referred in Duolingo as 'skills'] it does not let you go there, that is nice, too. I control myself, I can find the gaps [subjects that participant forgets] and repair them. I think the fact that I cannot go to locked places is also good, because I am obviously not ready to go to those places. If I have not proceeded to those levels, there is no point to be able go to there.

H: How about anxiety? Do you feel anxious when using Duolingo at all?

B: Not at all, I feel delighted. When I am done with the level, I say 'Ohh!' [Turkish exclamation for relief]

H: [Laughs] Great, I am asking this because there is a social side to Duolingo, too.

B: Yeah, no, I never use those. All by myself.

H: Do you go to social clubs or check your mistakes at the discussion forums? I mean the little flags that appear when you make a mistake and take you to the forum where people discuss about a lot of things.

B: No, not at all. I do not use those things.

H: How about your motivation, do you feel fluctuations in your motivation?

B: If I am bored, I go to entertaining subjects. I never give up. In the worst case, I get a pen and paper and do the tasks slowly.

H: How do you feel about the authenticity of content in Duolingo. Do you think the sentences and the sound are natural?

B: No, not really. It would be very different in real life, in my opinion. As if you would use those grammatically correct sentences. Everyone says 'hello guys', 'hey' [imitating native speakers]. My goal is to be understood, and to understand. In Duolingo, you care about grammar and rules, otherwise you lose points. I think they should make it so Duolingo prompts a very short explanation before each new unit [subject/skill] when necessary. It should explain why it needs to be like that.

H: What do you mean?

B: For example, adjectives. It should explain why they come before the noun or after, and so on. With one or two sentences, it should explain or make a summary, and give the essence of the unit. Now, I am learning everything by trying and failing. Even if there were one or two sentences, it would be enough. It would be very beneficial, because we start without knowing what to do. Sometimes, I learn something from several weeks ago while doing another course. I can only realize then, I mean what I needed to do in an exercise that happened weeks ago. I say 'heeee!' [Turkish exclamation for realizing something very interesting], and I understand why we were supposed to do it that way.

H: This is a very fruitful conversation. I really appreciate your input. I have another question. Even though you are not a dropout, why do you think those who abandon Duolingo are doing

so? You have seen the factors in the survey [participant repeats the factors]. Which one, in your opinion, is the most relevant reason?

B: The most important is the laziness of people; you are learning a language and for free. Also the fact that they are whimsical, and they do not know the value of the things around them. They are looking for pleasure and joy all the time. The youth is so easily distracted and bored. It is not just Duolingo. I think this is the most important factor, they do not have motivation. They do not even read books. I am 61 years old, if I can learn English, the kids should be sweeping it all! But they like free riding. They want everything to be easy.

H: I understand. Well, thank you very much for sharing your opinion. The comments you made are really insightful and helping. These were all the questions I had for you. Thank you for your time. Do you have any other questions or comments?

B: No, I do not think so.

H: Okay then, I am going to stop the recording here.

Interview with J

(Advanced-Intermediate, Active, used Duolingo for 12 months)

Skype Video Call – Conducted on June 15th, 2:30 PM

TRANSLATED TO ENGLISH

H: Hi J, thanks for joining me for this interview.

J: Sure, my pleasure.

H: Is your connection alright? Do you hear my voice well?

J: Yes, both are good.

H: Alright. Let's start then. So, how long have you been using Duolingo?

J: Almost a year, I guess.

H: A year. How many hours do you think you use Duolingo per week? You can reply in hours per day if you wish. I am asking for a rough approximate.

J: I guess half an hour a day but not consistently over the year.

H: Very good. Which language?

J: English and a couple of other languages.

H: What is your current level of English, your proficiency I mean?

J: I can say advanced-intermediate, I have taken TOEFL in the last year and I scored 95/120.

H: This was before you started Duolingo or after?

J: There was an overlap I suppose. I am not sure.

H: I mean, did you use Duolingo to achieve a better score in TOEFL? [Participant affirms.]

Oh, OK, Good. Well, did you see any improvements after you started using Duolingo?

J: Yes, especially for my speaking, I can say it improved my pronunciation. It must have helped for the TOEFL test, too, I guess.

H: Your pronunciation has improved, very nice. Okay, so, how would you rate Duolingo? What is your overall satisfaction about it? For example, do you think it is a good language learning app?

J: Especially for the first couple of courses (Duolingo skills), it feels like it becomes a bit repetitive but then, [pauses] how should I put it... You get used to it and feel like learning something new every time and improving your skills. Not only for speaking but also for grammar knowledge, I benefited from it a lot.

H: Very well. Are you still using Duolingo as we speak?

J: Sometimes, but not often for English. I have been using it to learn French and Chinese for a while now.

H: Hmm, interesting. So, did you achieve your goals for English? Are you done with English?

J: Yes, for English I would say I learnt everything that Duolingo can offer. I've completed the skill tree!

H: Wow, that's amazing. Congratulations! Okay, so during the time you used Duolingo, were there any problems? Did you have any dissatisfactions about Duolingo?

J: Yes, first thing that comes to my mind is poor speech-to-text (AVR) technology. For example, I used Google Translate and its speech function at the same time while I was using Duolingo for my speaking skill. But unfortunately, Duolingo failed many times, while google was able to understand what I say. I mean, same phone, same person, same sentence; google could transcribe it while Duolingo failed to give me a pass.

H: So, to be clear, what you are saying is, Google Translate's AVR was able to understand your English sentences, while Duolingo could not. You think that Duolingo has an inferior AVR or maybe it is intended?

J: Yeah, no, I think it is just a technical issue with the app.

H: Very interesting you tested that. One question here, do you think having an inferior AVR technology for an app like Duolingo could lead you or other users to get frustrated and abandon an app? Is it an important dissatisfaction for you?

J: Exactly. I did not leave Duolingo but, for example, sometimes it would not even accept a simple word that I say, and it is super annoying. But I did not know any other app (language app) at that time, so I sticked with Duolingo. I guess the technology is still not at that stage yet, where people can easily integrate (interact) with it and practice speaking.

H: Did it at any point cause you to stop using the app, even for an hour and do something else? Or did you keep recording again until you got the voice recognition, right?

J: No, I always kept trying, I think. Honestly, after a few attempts it catches what I say. It gets fixed after some time, but it does not feel good to make a mistake while you actually do not.

H: Since you said you were mainly using Duolingo for speaking, am I right to assume that you were using Duolingo to practice speaking although you were not quite satisfied? Because you also said you still achieved your goal through it, right?

J: I mean, to be fair, I was satisfied with it for the most part. I just remember having issues very often and getting frustrated, that's all. And yes, it satisfied my need, practicing speaking, for what it's worth.

H: Perfect. Did you have any other issues at all, other than AVR issues?

J: Uhm, no. I do not recall having any other issues.

H: Okay. Well, now I am going to ask you questions about what could be an important factor to cause app attrition in Duolingo. By app attrition, I mean when users start to no longer use Duolingo and ultimately abandon the app. I know that you did not drop out from the app and you accomplished your goals in it. I am just curious to know what you think could be an important factor.

J: I understand, sounds good.

H: First one, motivation. How was your motivation throughout your learning period? Do you think motivation can be a factor for dropping out of the app? I am interested to learn if you ever felt demotivated to use Duolingo?

J: Sometimes, yes, I felt demotivated. Actually, do you know the bar that fills when you complete lessons.

H: The experience bar?

J: Yes, that one. I think that bar is genius. You know if you fill at a few days in a row… [pauses] it is…

H: You mean having a daily streak?

J: Exactly! That is a very good way to motivate people. For me, it was very important.

H: Interesting, did you ever feel like you were demotivated to study English, but at the time, you still opened Duolingo and practiced English just to keep your streak?

J: Yeah, many times. And as soon as I completed it, I would close the app immediately. I am usually not very motivated [laughs] but it still helped. I needed to spend like 15-20 minutes to complete my quota, you can define your quota yourself. That is also very convenient.

H: Perfect, how about the social side of Duolingo? Have you ever used Duolingo to socialize with people?

J: Is there an option like that?

H: Yes, indeed. Have you ever noticed the friends tab, where you see your facebook friends and what their scores are?

J: Oh, it's maybe because I did not synchronize my facebook with Duolingo. Because they ask you if you want to link your accounts in the beginning and I did not. Well, yeah I did not know that was an option. I never interacted with anyone in Duolingo.

H: How about the discussion forums? There are little flags that show up each time you make a mistake and when you touch them you are directed to the discussion forum.

J: No, I never used it.

H: I see, okay then. How about anxiety? Have you ever felt anxious in Duolingo?

J: Yes, at certain stages, you get these timers on top giving you a time limitation. I get very nervous whenever I have those timers and I feel excited and I make mistakes.

H: I understand. Do you think it is a bad thing to have timers on these practices? Do you think it would be a dissatisfaction for you, or for others to leave the app?

J: I don't know. Probably not. It is just a timer; I do not think people would be extremely stressed to leave the app. But for some users, it might be the case.

H: I see. How about control over the app. Do you feel in control of the app? Can you customize it or pick what to study?

J: No, not really. The course subjects are fixed, and you have to follow that order. Sometimes I feel like studying another subject, but I cannot change it because it is locked. You have no control over it.

H: Do you think it is an important factor?

J: For me, a little bit. But, as I said, I did not leave the app. So, none of these issues are really really important for me.

H: Okay, in that case, I'm moving on. I have two general questions about Duolingo for you and then we are done. How do you like the instruction quality overall including the content in Duolingo, technical problems etc.

J: I think there is a good variety of content. It covers a wide range of subjects and that's good. I think it is well thought and developed by professionals. So, I like the instructional quality a lot. I really benefited from it.

H: Do you think it is better than a language course, for example?

J: No, I mean this is a free app that gives you a lot in return for a couple of ads. But it does not replace a professional teacher who has his/her full attention on you. No (laughs), not yet!

H: Last question. It has a sub-question, too, okay? So, here I go. You filled out to survey and saw a lot of factors there, from motivation to social isolation, anxiety, lack of success, inadequate proficiency, inability to regulate/control the learning, lack of guidance, content relevance, instructional quality and technical issues. When you think all of it, what do you think is the most important factor for learner dropout as a user who has used Duolingo for a year. And if you have more than one, what is your personal order?

J: In my case, it was mostly technical difficulties, the AVR, and motivation. I have a lot of friends who left Duolingo after a few tries just because they did not have a good motivation to learn English.

H: I see, so technical issues and motivation are your top picks.

J: Yes.

H: Alright. Well, do you want to add anything else? Have we talked about everything you wanted to share?

J: Uhm, let me think.

H: Do you have any other things that you want to mention about this subject? Any concerns, dissatisfactions or ideas?

J: No, I do not think so. That's all.

H: Okay then, perfect! Thanks for your time. I really appreciate your time and the valuable feedback.

J: You are welcome. It was a good experience for me, too.

H: Okay, I will stop recording here.

Interview with S

(Pre-Intermediate, Dropout, used Duolingo for 8 months)

Skype Video Call – Conducted on August 16th, 11:00 AM

TRANSLATED TO ENGLISH

H: First of all, thank you very much for accepting my interview request.

S: Oh, of course, it is my pleasure.

H: I am going to ask you a few questions about Duolingo, in order to get further insight about my thesis topic, which focuses on why people abondon Duolingo. You may take your time to answer them, think about them and give me your personal opinion and feelings based on your own experience. That is all I am looking for, there no right or wrong answers for these question.

S: I understand, okay, let's see.

H: First things first, how long have you used Duolingo?

S: I used it for 4-5 months, about one and a half years ago.

H: Good, and how long do you think you were using Duolingo per day or per week? Answer in any of them, which is easier for you. You can give me a rough estimate on average.

S: Well, when I opened Duolingo, I was I guess using it for 30-45 minutes on average.

H: Okay.

S: I was using Duolingo in the bed when I wake up early. But I was using it actively for a while, almost every day. Even if I could not use it on the weekends, I would definitely spare some time for it on the weekdays.

H: So I assume you stopped using Duolingo completely now.

S: Yes, I am no longer using it.

H: What was the main reason for your abandonment?

S: Well, the main reason for my abandonment, [pauses] it was not like a conversation. When you hear the words, it was not like when you heard them from real people. It was a robotic voice, and I do not think it would help me on a real conversation with real people, it is normally so hard to understand the English spoken by a native English speaker. But then again, they have body language and signs, you somehow make a connection. With Duolingo, I could not establish that. Also, on some of the subjects, I would not understand what I was doing or to what end. I would simply not understand the point of some exercises.

H: I understand.

S: There were sometimes very weird sentences, completely non-sense stuff that nobody can use in daily life.

H: I see.

S: Do you remember the word cards/slips we used to have at primary school to learn Turkish? The teacher would bring those words to make up sentences, for example, 'Ali look at the horse', 'İpek catch the ball'. The sentences were just like that in Duolingo.

H: So were all these discouraging you to learn English with Duolingo?

S: Absolutely. It would demotivate me.

H: Can you talk more about your motivation, now that you mention it? Was it getting less and less or somewhat fluctuating?

S: I mean, if I knew that Duolingo would actually work for me, I would definitely find the time to spare for it. I wanted the time I spent there, to be more precise, the time I spent for learning English in general, to gain me something. But especially towards the end, I would lose my hope and just close it.

H: And how would you feel when you close it? Or what would you think?

S: Well, I would think that Duolingo was not a platform to learn English, it was more like a platform to learn new words and phrases. The way it teaches was not compatible with me.

H: And then what did you do?

S: I just left the app, signed up for a language center because I thought I would not go anywhere with Duolingo.

H: And how did it go? Were you satisfied there as compared to Duolingo?

S: Yes, sure. It was better, more instense, you do not have the luxury to stop when you do not feel like learning. You are paying, so you take it seriously, too. There are people and you are social.

H: I see. If we go back to my factors for dropout.

S: Oh, [laughs] I drifted away with the course. Yes, I think they are logical.

H: No, I mean, you gave me some clues about the factors for your dropout. Talked about bad sentences and the robotic voice, which indicates to authenticity and relevance of content. You told me the way it teaches was not good for you, which somewhat tells me that you were not content about the instruction in there. You also said you could not interact or get engaged in a conversation, I am curious here, did you have social issues in Duolingo?

S: No. I do not think so.

H: Have you ever visited the discussion forums, chat interfaces, Duolingo clubs or events, or somewhat do something about Duolingo at social media?

S: No, none of them.

H: I see, did you not know them or did you prefer not to use them?

S: I preferred not to, I know the forums and clubs but I do not take them seriously or beneficial.

H: Did you get uncomfortable or anxious? When you think about those clubs, would you not consider them as social opportunities to get involved in real conversations?

S: Yes, I do not know. I saw the clubs and everything but they did not really attract me. I was not interested. They are not native speakers, too [participant means the club members], they are learners like me. So I did not want to waste time there. I did not feel anxious at all.

H: I understand. How about technical difficulties, have you ever experienced anything?

S: No, I mean very rarely, sometimes when I would close the app before completing the course I would lose some of the progress but it happens in every app.

H: I see. Okay, so we covered a lot of things. Thanks for answering all my questions. If I were to ask you one last time, what is the mean reason behind your dropout or what is your impression about Duolingo, what would you say?

S: I think Duolingo could be a good start for learning English. Good for orientation. Yet, the content is not good enough, it is not adequate.

H: Okay, these comments are quite insightful. Thank you very much for your time! I really appreciate your inputs. This is going to be all my questions, do you have anything to add?

S: No, I think I told you everything I wanted to.

H: Alright, then, I am going to stop the recording here.

Interview with G

(Advanced, Dropout, used Duolingo for 30 months)

Skype Video Call – Conducted on June 19th, 11:00 AM

TRANSLATED TO ENGLISH

H: I am starting the recording.

G: I think I'm good.

H: Alright, you finished reading and signing the consent form?

G: Yes, totally, I already did.

H: Can you send that to me? Just drop it on the chat panel on the right.

G: Okay, a moment. Done.

H: Thank you! Yes, first of all, how long have you been using Duolingo? And, are you still using?

G: I stopped using it for some time now. I cannot tell how long for sure; but I haven't used it for at least three or four months now. But, back to your question, I had used it for approximately two years. Or two and a half.

H: Two and a half years, that's a long time. And, why did you stop it?

G: When I first started it, it was pretty useful and interesting. But after some time, it did not make sense and I did not find it very useful, or at least not as useful as it used to be.

H: I understand. what exactly did not make sense for you? Can you explain it a little? Did you have any problems with the app?

G: I believe it had something to do with my motivation; I got bored. But I would say, I found the sentences used in the app to be decontextualized. I think this was above anything else. When I first started using the app, I was a beginner and I said 'OK, the sentences will get more complicated' but after a while I felt stuck with the same sentences over and over again.

Simple, six or seven words sentences. I felt stuck with these simple and beginner sentences, not real sentences like the ones you use in real life, you know? Duolingo, I mean the sentences you learn in Duolingo, you cannot really use those in real life.

H: Oh, I see, very interesting. Before we go any deeper, you were using Duolingo for two and a half years, right?

G: Yes.

H: Interesting that the sentences did not go more advanced. What is your proficiency level?

G: Currently, I am advanced, but I don't think it is thanks to Duolingo.

H: I see, did you use another app other than Duolingo? Or did you give breaks during this two and a half years?

G: Yes, I also tried memrise. In the beginning, I did not like it and kept using Duolingo, but now it is my go-to app.

H: Interesting. How about breaks, did you take any while using Duolingo?

G: Yes, I was not a very constant student! [Laughs] But I used both of them. I was depending more on memrise after a certain time for my progress to be honest.

H: I understand. How many hours per week do you think you used Duolingo alone?

G: I cannot tell for sure. But I used both apps a lot. I went all the way through both apps. I can say at least 5-6 hours a week.

H: Each app or in total?

G: Yeah, in total. But for the most part, I used to spend more time in Duolingo. But since graduation, I am only using memrise.

H: I see.

G: Oh and now, sorry for interrupting, I am kind of absent in memrise, too! [Laughs] I am using another website where I can meet some real people and practice English. I think this has

been much more efficient than either of the apps. For a couple of months, I have talked to people over Skype and engaged in natural conversations, doing the kind of things I am looking for.

H: Wow, very nice. Okay, if you were to, [breaks the sentence] you know, I'm investigating the factors behind people's decision to drop out from the app. Specifically, I am investigating why people are leaving Duolingo. Two and a half years is a very long time, you have been through many updates, various versions. As a very experienced user, what do you think, what kind of factors contributed to your decision to ultimately leave Duolingo after almost three years?

G: To answer that question, I also want to say what kept me in it for all this time, although I had some problems with it, the first reason was the social side of it. [participant means social opportunities] You write something in a thread and people comment on it and help you. This is one of the factors that kept me going.

H: This is in Duolingo, right. You mean the discussion forum?

G: Exactly, exactly. So that was something, as I said, but at the same time I realized that Duolingo is not that useful if you can replace it with actual people, and then it does not make sense to use it anymore. Apart from that, when I wanted to use [participant mimics quotation marks] the English I learned from the app, like when I talk to people, I realized that I was repeating only a few phrases I learned from Duolingo. This was a long time ago. I was like a robot, or a parrot, to be precise. I felt like I was getting disconnected from people, like I was the only English learner in a room full of foreign people.

H: I see, so, correct me if I am wrong, would it be right to say that Duolingo was just not social enough for you after some time, I mean after meeting real people who speak English? Because, if I go back, you mentioned about the discussion forum to be social, but aside from

that, you did not have a lot of human contact in the app as far as I can see. And after you replaced Duolingo with real people, you mentioned that Duolingo became somewhat idle, social-wise. So, what do you think?

G: Of course. The textbook-kind of language learning is not for me, I am a social learner and I feel that I need human contact when I study a new language. Duolingo was not social enough for me. I believe that social apps that focus on matching people and encourages them to teach each other are more beneficial than Duolingo-type apps. Maybe if I was a complete beginner, I would appreciate apps like Duolingo, because without texts and some memorizing, it would be very difficult to start. So maybe in that sense, Duolingo might work for some people. But we have studied English for 12 years at school. Everyone in Turkey has one way or another goes through an English lesson for a good amount of time. For [participant makes quotation marks] Turkish people, maybe practicing is more important, but for me, I need to be able to speak.

H: I see, how about the factors that you've seen in the survey questionnaire? If you want, I can refresh your memory on the factors. [reads through the list of factors] Did you experience or suffer from any of these factors?

G: To be honest, I never had a serious technical problem with the app except for the content there. I never experienced any crashes or freezes. The only tech issue I had was when, for example, there is a blank in some test and you can fill it with one word, but there are indeed other answers that Duolingo just does not know. So the content is flawed.

H: Oh, I see what you mean. Like synonyms, let's say, it accepts one word but does not accept the synonym of that same word?

G: Yes, that, and sometimes this happens in other forms, too. For example, you can write a sentence, and then write the exact thing in other words, but since it's code, it only accepts

what it was told to it earlier right? So, it does not have a lot of flexibility there.

H: Hmm, I see, but was this a factor for you to leave the app, though?

G: I mean, not specifically, but it was annoying for sure! [laughs]

H: I understand.

G: And another limitation is that there is a road that you unlock as you go (skill tree). You know what I mean, right? You cannot access certain subjects in that tree before you go through a bunch of other subjects selected by Duolingo. I do not appreciate this at all. I mean, it makes sense that certain subjects may be advanced subjects. But for example, if you already know numbers or fruits very well, -for me I knew the numbers in English already- you should not be forced to go through them anyways. It must allow you to skip certain subjects if you do not need to practice them. You see, I am a language teacher, too. I taught Arabic to Turkish students and Turkish to Arabs when I was in Qatar. I still teach. And I feel that I am capable of deciding my own path or curriculum, or at least prioritize my own subjects to study. This was one of the things I truly hated about Duolingo. I think they should really find a way to bypass this problem. You see, it is 2019 now and there are hundreds of other apps in the store.

H: I understand. One last question, if you were to make a hierarchical order among these factors? [PI reads the factors again] You have, [pauses] let's see how many, so far, you shared three major dissatisfactions in your examples: the social aspect, learner control and irrelevance of content. Which one is the most important?

G: I don't know, I would probably say the social aspect. Not being able to talk to real people in real time, to be more precise.

H: Perfect. Thank you very much, that's quite enough for me. Okay, I am about done, do you have anything to add?

G: Let me think. No, I think I expressed everything I wanted.

H: Well, great. Perfect. Thanks for your time again. Let me know if you have more thoughts later, you got my email address.

G: Sure thing.

Interview with V

(Advanced, Active, used Duolingo for 1 year)

Skype Video Call – Conducted on August 11th, 10:30 AM

TRANSLATED TO ENGLISH

H: Thanks for taking the time to make an interview with me about Duolingo:

V: You're welcome.

H: If you are ready, I'd like to start by asking you how long you have been using Duolingo.

V: I've been using it for a long time, almost a year.

H: Great! Wonderful, have you ever stopped using it for a while?

V: No, not really. I do not remember. I use it at least every week, sometimes I keep long daily streaks for days.

H: What do you think about the factors presented to you in the survey? Have you ever suffered from any of them?

V: I did not really suffer from them, to be honest. I mean, not in a negative way.

H: So, you are saying that none of these factors I presented you in my survey was important enough to reduce your motivation or get you out of your goals.

V: Yes. I mean, I understand them, and I understand there are shortcomings in Duolingo. And it is normal that people can drop out from it. But if one makes his/her mind to really devote to something, then s/he can achieve anything. It is not an excuse for me to drop out of Duolingo. Now, on the other hand, if I do not learn English on Duolingo, I have to pay a language course and I do not want that. So, I try to visit Duolingo every day, and step by step, I feel like I have learned a lot of words. Of course, it is not an easy thing to learn a new language. But I can understand a lot of things in the games that I play now. I can feel that I made progress.

H: Okay. In that case, I would like to ask you another question. You told me that you understood these factors could lead other people to leave the app. Which of these factors do you think, from your own standpoint as a long time Duolingo user, could lead those people from dropping out of the app?

V: I would say motivation. Because I think people do not leave the apps because they are bad, they leave the app because they do not take language learning seriously. They do not take making a mistake in Duolingo seriously, they just keep going. They do not have the motivation or ambition. Maybe it is not relevant, but I have a cousin, and he learned two languages all by himself by just reading textbooks. He is older than us, in his time, there were not apps like these. What I am trying to say is people want easy things. I am sort of an app designer, too. I mean I do not write the code but I am part of a team. Apps are designed for people who like easy things. And these people cannot learn a language. We first tried Duolingo with my girlfriend, and now I have unlimited lingots [in-app currency] but she stopped using it after a few times.

H: Wow, very insightful. And maybe I should talk to your girlfriend and see how she feels about Duolingo, too? Did she take my survey, too?

V: I do not know. No, I suppose she did not. As I mentioned, I was interested in Duolingo and interested to talk to you. But, my girlfriend, for example, not interested. She gives up easily. We are different, I think most users of Duolingo are different from each other.

H: I see.

V: For example, if I'm tired to use Duolingo, I trick my own mind and go to other subjects to keep my daily streak. Because if I fail the daily streak I get demotivated, I feel like I lost my progress. When I feel powerful and motivated again, I continue my own path. Another example, I look up grammar rules on the internet, I search for it. I do not find Duolingo

courses adequate. But other people do, and they get bored. My girlfriend used it for a few days and then threw it away. That's why she did not take your survey. I believe factors have some effect but it's the personality [participant means motivation] that matters.

H: Oh, okay. Well, she still can! [take the survey] Alright, that's going to be all. I will stop recording here unless you have questions or anything else you want to add. Oh, I almost forgot, what do you think about the other factors? Let me read them for you [PI reads the factors aloud]. Do you think any of these are affecting you?

V: No, not really. Maybe instructional quality, because I do not think it is adequate in terms of grammar rules and explanations. Not enough notes or information. But that's it.

H: Before I forget, what was you proficiency level again?

V: I do not really know. I guess I am intermediate or something between beginner and intermediate. What I mean is I started as a beginner, I mean intermediate. but I must be quite advanced now.

H: Okay, I will take my notes as advanced then. Thank you very much for your time again.

Interview with A

(Pre-Intermediate, Dropout, used Duolingo for 8 months)

Skype Video Call – Conducted on June 25th, 11:00 AM

TRANSLATED TO ENGLISH

H: Let me begin by thanking you for accepting the interview request. I really appreciate your time.

A: No problem. It's all good. I hope I can help you.

H: Of course, you can, and also remember, there are no right or wrong answers. All I care about is how you felt and what you think about Duolingo, alright?

A: Yes, I understand.

H: So, how long have you been using Duolingo, as a start?

A: I guess, for 7-8 months. Give or take.

H: How many hours per day? You can reply in hours per week, too.

A: I think, 20 minutes per day and, [pauses] let's see, 2-3 hours per week. I mean, roughly. But now, I stopped using it; 2 months ago, more or less.

H: Oh, I see. We will get to that later. Now, okay, let me take that as a note. Okay, which language did you study in Duolingo?

A: English and German. But English mainly.

H: And your proficiency level in English?

A: Around Intermediate, I took TOEFL last month and my grade was 75 [out of 120]. Actually, I was feeling a little sick that day. In any case, I will retake it. I also took FCE a few years ago, my grade was B, I guess? I am not sure; I can check it out for you. I took that test a while ago.

H: That is not necessary. TOEFL was more recent, right? [participant affirms] Well, then it does not matter. TOEFL score is more than enough for me. How long have you used-- oh wait, sorry, I already asked that? Okay, let's focus on you leaving Duolingo. Was Duolingo the only app you were using when you left it?

A: I was using Duolingo and another app at the time. I don't quite remember but I can check my phone for you.

H: Okay, I will focus on Duolingo only. Did you use it to get prepared for TOEFL?

A: Yes, for TOEFL.

H: Good. How did you use Duolingo, like on a mobile phone or a desktop computer or on tablet?

A: I can say both, except for the tablet.

H: You used it on both platforms, mobile and desktop. But I think the mobile is more convenient because you can use it wherever you want it, what do you think?

A: Yeah, sure. I mean, I can use it on the bus, at work and everything. At my workplace, I would use it on the desktop. I think it has more features on the desktop version.

H: True, yes. Did you feel that Duolingo improved your English at all?

A: Maybe a little, in terms of vocabulary. It did not help improve my grammar, but it definitely helped with my vocabulary, learning new words etc.

H: Were you satisfied with Duolingo's overall performance? Did it meet your expectations?

A: Not so much. At the beginning, it was fun. I did it every day for at least an hour, studied regularly but after some time, I got somewhat bored. That's why I stopped it. A few times I just forgot to use it and lost my streak, too. And after I lost the streak, I did not want to reopen it.

H: I see. So, do you think motivational reasons were important in your decision to drop out?

A: It becomes boring after some time because you are doing the same thing every day. There is not much of an interaction. I mean, there were some milestones, it was fun to reach them in the beginning but after a while, human nature kicks in, you lose interest. Because the milestones are also more or less the same, always the same goals, same drills…

H: Apart from Duolingo becoming boring after a certain time, do you have any other comments on why you abandoned the app? Anything that you noticed that might drive users to leave the app?

A: Well, I think it does not have a solid instruction way. In my opinion, it just gives you some sentences to translate, pinch in some different settings or subjects like animals, family, or tenses. And it expects you to learn as you translate these sentences. But I don't find this way, this method systematic. They look like random to me; even the sentences, sometimes they get really non-sensical, like 'the goat is drinking the milk' or 'the, uh, my nephew is eating the blue orange'.

H: So, you find it a little arbitrary?

A: Yeah, in Turkey, we learn English very systematically. So, it is weird for me. We got tenses, phrasal verbs, a lot of different grammar subjects, and we learn them in an order. The structure is so important that sometimes people will have flawless grammar, but they have a hard time speaking because they do not spare that much time for practicing or socializing with foreigners.

H: Interesting. Yeah, continue please.

A: I was going to say that we are already good at memorizing and working hard to learn a language. But when it comes to talk fluently, I do not think apps like Duolingo can help. I saw this question at your survey, it said something like 'Duolingo is a complementary app for language education to be taken elsewhere', this summarizes my feelings about Duolingo.

H: Yeah, there was a question about that one. So, you think it cannot teach English on its own. Can I ask why do you think so?

A: It seems to me that without human interaction, we got bored very fast. No matter how entertaining the app is, it becomes repetitive.

H: Yes, I see what you mean. Now that you mention it, how do you feel about the social side of Duolingo? I mean the discussion forums, social clubs, events. Have you ever joined a Duolingo meetup event?

A: No, I visited the forums a few times and I found it useful. But every other day, I started visiting the forums less often.

H: Any reason why?

A: I do not know. I just did not. I cannot tell a specific reason.

H: Fair enough. Alright. When you think about all the factors I have in my study, you can also see them in the chat box at the righthand side by the way, which ones do you think are the most relevant or important? Please take your time to read them again and do not rush to answer.

A: In my opinion, motivation and quality are the most important factors here. I don't expect the app to be so social, it depends on the person if you ask me. It can offer a lot of social things, like clubs, games and meetups but if you are not that social, you will just not benefit from them.

H: I totally see what you are saying. Can you further explain why you think motivation and quality are important?

A: For me, [pauses briefly] if the quality is not good, you will lose your interest. That's what happened to me. In the end, it is a free app, maybe it would be better if it was paid. You know, sometimes people go to gyms just because they pay them. When it is an app, it is not

serious, I visit it maybe once a week, sometimes a few times a week and promise myself that I will have the streak. But I never really got too far with the streak. My personal record was 12 or 13 days in a row.

H: Perfect. Well, do you have any questions or anything to add?

A: Not really, I still use Duolingo from time to time. I'll look at it when I get home.

H: That's the spirit! I'm glad I made you remember your goal! [Laughs] Thank you very much for your time. I have no other questions to ask. I will stop recording here.