Effects of a Gamified MALL Application on Developing EFL Preparatory School Students' Speaking and Enjoyment and Reducing Speaking Anxiety

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Abstract:

The present study investigated the effect of utilizing Duolingo, a MALL (Mobile-Assisted Language Learning) gamified application, on Egyptian second year preparatory school students' EFL speaking skills. The study also explored the impact of Duolingo on boosting foreign language enjoyment and alleviating speaking anxiety. The study examined the correlation between speaking, foreign language enjoyment, and speaking anxiety. To participate in the study, 60 EFL students from a preparatory female school were randomly assigned into two groups of 30 each: one experimental and one control. A speaking test and a questionnaire were administered as part of the mixed-methods study. The post-test results demonstrated a statistically significant difference in the mean scores of the overall speaking competence and five sub-skills between the experimental and control groups in favor of the experimental group. In the post-administration of the questionnaire, there was a statistically significant difference between the mean scores of the two groups in language enjoyment, favoring the experimental group. The results also indicated that the participants in the control group were more anxious than their counterparts in the experimental group. Moreover, there was a negative correlation between speaking anxiety and enjoyment, a positive correlation between speaking performance and enjoyment, and a strong negative correlation between speaking anxiety and speaking. According to qualitative data from open-ended questions in the questionnaire and interviews, the experimental group perceived Duolingo favorably in terms of reducing speaking anxiety, enhancing foreign learning enjoyment, and developing their speaking skills. The current study provided implications and recommendations for future research.

Keywords: *Gamification, MALL, speaking, EFL enjoyment, speaking anxiety*.

فاعلية تطبيق قائم على التلعيب باستخدام الهاتف المحمول على تطوير مهارة التحدث والاستمتاع بتعلم اللغة الإنجليزية كلغة أجنبية وتقليل قلق التحدث لدى طالبات المدارس الإعدادية

المستخلص

تناولت الدراسة الحالية تأثير استخدام تطبيق دوولينجو Duolingo(تطبيق تعلم اللغة بمساعدة الهاتف المحمول)، على مهارات التحدث باللغة الإنجليزية كلغة أجنبية لدى طلاب الصف الثاني من المرحلة الإعدادية في مصر. تقصت الدراسة أيضًا تأثير دوولينجو Duolingo على تعزيز الاستمتاع بتعلم اللغة الإنجليزية كلغة أجنبية وتخفيف القلق من التحدث. كما فحصت الدراسة العلاقة بين مهارة التحدث، والاستمتاع بتعلم اللغة الإنجليزية كلغة أجنبية، وقلق التحدث. وشاركت في الدراسة ٦٠ طالبة من مدرسة إعدادية للبنات حيث تم تقسيمهم بشكل عشوائي إلى مجموعتين من ٣٠ طالبة: مجموعة تجريبية ومجموعة ضابطة. وتم إجراء اختبار التحدث والاستبيان كجزء من أدوات الدراسة ذات المنهج المختلط. أظهرت نتائج الاختبار البعدي للتحدث فرقًا ذا دلالة إحصائية بين المجموعتين التجريبية والضابطة في متوسط الدرجات لمهارة التحدث الكلية وخمس مهارات فرعية لصالح المجموعة التجريبية. وأظهرت نتائج الاستبيان وجود فرق ذو دلالة إحصائية بين متوسط درجات المجموعتين في الاستمتاع بتعلم اللغة الإنجليزية كلغة أجنبية لصالح المجموعة التجريبية. كما أشارت النتائج إلى أن المشاركات في المجموعة الضابطة كانوا أكثر قلقاً من نظيراتهم في المجموعة التجريبية. علاوة على ذلك، أظهرت النتائج وجود ارتباط سلبي بين قلق التحدث والاستمتاع بتعلم اللغة الإنجليزية كلغة أجنبية، وارتباط إيجابي بين مهارة التحدث والاستمتاع بتعلم اللغة الإنجليزية، وارتباط سلبي قوي بين قلق التحدث ومهارة التحدث. ووفقًا للبيانات النوعية التي تم جمعها من الأسئلة المفتوحة في الاستبيان والمقابلات، جاءت انطباعات المجموعة التجريبية إيجابية عن دوولينجو Duolingo من حيث تقليل قلق التحدث، وتعزيز الاستمتاع بتعلم اللغة الإنجليزية كلغة أجنبية، وتطوير مهارات التحدث لديهم. كما اقترحت الدراسة الحالية مجموعة من التوصيات للأبحاث المستقبلية.

الكلمات المفتاحية: التلعيب، التعلم القائم على الهاتف المحمول، مهارة التحدث، الاستمتاع بتعلم اللغة الإنجليزية كلغة أجنبية، قلق التحدث.

Effects of a Gamified MALL Application on Developing EFL Preparatory School Students' Speaking and Enjoyment and Reducing Speaking Anxiety

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Introduction

Mobile-Assisted Language Learning (MALL) is a learning experience that takes place through mobile devices so that learners can access learning content and activities from various geographical locations (Shortt, Tilak, Kuznetcova, Martens, & Akinkuolie, 2021). Gamification in MALL is a rapidly expanding field in which researchers are looking at new ways to implement MALL applications in education and acquire a better understanding of students' learning. Gamification refers to the utilization of game-based aspects to engage learners in the learning process and boost their enjoyment (Kapp, 2012). Digital gamification in learning environments can be motivating for language learners as it enhances their language proficiency, motivation, and confidence (Dehganzadeh & Dehganzadeh, 2020). Shortt et al. (2021) argue that incorporating gamification features into MALL platforms facilitates tracking students' language learning processes and improves their behavior, dedication, and motivation.

Duolingo is considered one of the most successful gamified MALL platforms (Govender & Arnedo-Moreno, 2020). Duolingo is a free-of-charge language learning platform where users can learn over 30 language courses. The application can be installed on the iOS or Android operating systems. Learners can start by choosing the language they would like to learn and study from scratch, or they can take a placement test if they have previous knowledge. Learners can also set learning goals to achieve (such as completing a lesson daily) and receive bonuses for fulfilling these goals. However, failing to achieve the desired goal means that the app will reset the users' points to zero. Learners can maintain the streak for days if they accept some challenges (Botero, Restrepo, Zhu, & Questier, 2019; Shortt, et al., 2021).

Speaking is considered one of the most critical skills in English teaching and learning (Altun & Sabah, 2020). Students' confidence in speaking English allows them to get better job opportunities, run successful businesses, and access media and resources in English (Rao, 2019). However, speaking in English is a stressful experience for many EFL (English as a Foreign Language) students who find difficulty expressing themselves in English. Winarsih (2019) points out that EFL teachers use traditional teaching methods that focus on drilling and repetition and lack interaction and communication. Language exposure is also limited because EFL students are not given enough opportunities to practice the oral language in real-life situations. Curry, Maher, and Peeters (2020) consider speaking anxiety as the most significant affective factor that negatively influence EFL learners' speaking performance.

Speaking anxiety might be exhibited by freezing, confusion, forgetfulness, avoidance behavior, poor eye contact, and nervousness. Speaking anxiety can be the result of linguistic, cultural, and psychological factors. Speakers with a limited or inadequate linguistics knowledge are more likely to suffer from anxiety (Ellis, 2015). Horwitz (2017) states that anxiety is a multi-faceted process that EFL learners face when taking part in language learning situations. On the other hand, MacIntyre (2017) notes that anxiety can be the result of learner-internal variables (cognitive and emotional) and language learning environmental and social variables. Learner-internal variables that influence language anxiety might include personality traits, self-esteem, motivation, self-evaluation, and language proficiency levels. Learner-external variables involve teachers' instructional practices and fear of peers' reactions to mistakes (Dewaele & Dewaele, 2017; Mak, 2011).

Therefore, Oxford (2017) recommends various techniques to alleviate language anxiety, such as teachers' use of humor to promote students' positive emotions, creating a safe environment to practice the language communicatively, encouraging students to use the language that they are familiar with, and providing students with language elements and functions that help them communicate. Likewise, AlSobhi and Preece (2018) recommend that EFL teachers adopt innovative teaching methods to improve EFL students' speaking abilities.

Foreign Language Enjoyment (FLE) is considered the positive counterpart to Foreign Language Anxiety (FLA). Research on positive emotions has increased significantly as researchers believe that emotions affect language learning, motivation, and well-being (MacIntyre, 2017). Dewaele and MacIntyre (2014) claim that positive and negative emotions are part of our daily experiences and play a distinctive role in our behaviors and reactions. Hence, Dewaele, Witney, Saito, and Dewaele (2018) assert that FL teachers should "... strive to boost foreign language enjoyment rather than worry too much about students' foreign language (classroom) anxiety" (p. 676).

To this end, the present study investigated this new avenue of research in positive psychology and explored the effect of Duolingo on Egyptian preparatory school students' foreign language enjoyment. The study investigated the impact of Duolingo on developing EFL students' speaking skills. The study also examined the influence of Duolingo on alleviating EFL students' speaking anxiety. Finally, the study identified the relationship among these variables.

Context of the Problem

Kurniati, Eliwarti, and Novitri (2015) argue that inadequate exposure to the target language, whether in classrooms or in real-life situations, and low self-esteem are two obstacles that make students avoid communicating using English and tend to use their mother tongue. In a pilot study, El-Beltagy (2019) reported that the majority of second year preparatory pupils in most Egyptian schools had difficulties with oral production in English. She found that participants in her study suffered from poor pronunciation and fluency.

Therefore, the researcher conducted interviews with nine EFL teachers in a preparatory school in Gharbia governorate, Egypt to identify the challenges that students at this stage had in terms of EFL speaking. The interviewees agreed that most of their students felt they lacked adequate linguistic competence and confidence to participate in speaking activities in EFL classes. If students have to speak in English, they often use Arabic or switch between Arabic and English. Interviewees also reported that their students were afraid of making mistakes and avoided taking the initiative to speak in English. The teachers reported that students had difficulty using correct grammatical structures, pronouncing words, and picking vocabulary. Teachers said they rarely invite students to participate in role plays or prepare before speaking.

Additionally, the researcher interviewed eight students from the same school to learn about the difficulties they had when speaking English and the possible explanations for these difficulties. The students reported that they felt that speaking English was difficult because they were afraid to make mistakes in front of their teachers and classmates. They also stated that they felt uncomfortable because their linguistic knowledge of English was limited, so that they sometimes struggled to express their ideas or emotions in English. Additionally, six students were observed while communicating with each other and with the teacher on a given topic in an EFL class. The researcher noticed that students failed to maintain speaking in English for a period of time and chose the appropriate vocabulary relevant to the topic. They were shy and did not use long sentences; they just replied "yes" or "no" or gave short answers. The teacher corrected the students' mistakes immediately and directly. The teacher explained the idea of the speaking activity in the book, then students worked in pairs to do the activity. She provided the required vocabulary when the students struggled to come up with the appropriate words. Students were also called upon to answer some questions individually. She relied on modelling by asking the high achievers to start, then other students would follow. The teacher mainly used the school book as the main source for teaching speaking. Due to limited time, not all students participated in the speaking activities that were usually left until the end of the period.

Research Questions

This study sought to answer the following questions:

1. What is the effect of using Duolingo in developing second year preparatory school students' EFL speaking skills?
2. What is the effect of using Duolingo in developing second year preparatory school students' Foreign Language Enjoyment?
3. What is the effect of using Duolingo in reducing second year preparatory school students' speaking anxiety?
4. What is the relationship between speaking skills, speaking anxiety, and foreign language enjoyment?

The Hypotheses of the Study

The hypotheses were formulated as follows:

1. There is a statistically significant difference between the experimental group and the control group's mean scores on the post-speaking test in favor of the experimental group.
2. There is a statistically significant difference between the experimental group and the control group's mean scores of language enjoyment on the post-implementation of the questionnaire in favor of the experimental group.
3. There is a statistically significant difference between the experimental group and the control group's mean scores of speaking anxiety on the post-implementation of the questionnaire in favor of the experimental group.
4. There is no correlation between speaking anxiety and foreign language enjoyment.
5. There is no correlation between speaking skills and foreign language enjoyment.

6. There is no correlation between speaking anxiety and speaking skills.

The Aims of the Study

The current study aimed to explore:

- The effectiveness of using a MALL application, Duolingo, in developing the EFL speaking skills of second year preparatory school students in Egypt.
- The impact of Duolingo on reducing EFL preparatory students' speaking anxiety.
- The effect of Duolingo on fostering foreign language enjoyment.
- The relationship between speaking skills, foreign language enjoyment, and speaking anxiety.

The Significance of the Study

The present study would contribute to EFL students, teachers, curriculum designers, and researchers in the following ways:

- Through using motivating applications, EFL students can overcome their anxiety and be able to enjoy their EFL classes while speaking fluently in English.
- EFL teachers could use an innovative technological application to motivate students to speak without fear and better communicate in the target language. Teachers will also be aware of the benefits of using Duolingo in supporting students’ enjoyment.
- Curriculum designers could integrate elements from MALL applications like Duolingo into the preparatory school English course to engage students in learning EFL.
- Researchers would build on the findings of the current study by investigating the effect of Duolingo on different language skills and affective factors in EFL contexts.

Delimitations of the Study

This study was confined to the following factors:

- A sample of 60 second year preparatory school students studying English in a school in Gharbia, Egypt.
- The EFL speaking skills (overall speaking skills, content, grammar, vocabulary, pronunciation, and fluency), which are the skills that are covered by the syllabus of the second year preparatory schools in Egypt.

- The duration of the study, ten weeks, as the researcher conducted the experiment in the first semester of the academic year 2021-2022.
- The place of study (one preparatory school in a city in Egypt).
- The instruments that were used to measure students' speaking skills (speaking test) and emotions (FLSA and FLE questionnaire).
- The MALL application (Duolingo)

Terms Definition

- **Speaking skills**

The current study adopted Juhana's (2012) definition of speaking as the process of forming and sharing ideas or opinions in various situations through verbal and non-verbal symbols (transactional or interactional) to convey a message.

- **Foreign Language Enjoyment (FLE)**

The present study adopted Dewaele and MacIntyre's (2014) definition of FLE as the positive emotion that greatly affects learners' intrinsic and extrinsic motivation to learn a foreign language, enhances the acquisition of adaptive knowledge, and raises learners' awareness of the foreign language. Hence, FLE protects language learners from the lingering effects of negative emotions like foreign language anxiety.

- **Speaking Anxiety**

This study used Mukminin, Masbirorotni, Noprival, Sutarno, Arif, and Maimunah 's (2015) definition of speaking anxiety as an affective factor that impacts EFL learners' speaking performance. Speaking anxiety is manifested by learners' confusion, lack of confidence, forgetfulness, avoidance of taking part in oral activities, and worry.

Literature Review

This section delves into the theoretical underpinnings of Duolingo, as well as studies on speaking in EFL classrooms, foreign language enjoyment, and speaking anxiety. The section concludes with describing the relationship between these variables.

Duolingo and gamification in MALL

Research has proven that MALL provides an authentic learning environment and, therefore, develops communication among learners and between learners and teachers (Shadiev, Liu, & Hwang, 2020; Toland, Mills, & Kohyama, 2016). Learners can promote their communicative skills and engagement. Gamification involves using game-based mechanics, aesthetics, and game thinking to engage users, motivate action, promote learning, and solve problems (Kapp, 2012).

Out of the 20 MALL applications that Govender and Arnedo-Moreno (2020) analyzed for gamification elements, Duolingo was the best representative of the idea of gamification in MALL. They identified some gamification aspects in Duolingo such as indicating progress, offering immediate feedback, awarding time-dependent streaks and badges, encouraging customization and economy through Lingots to buy learning items, supporting knowledge sharing through discussion forums, and encouraging competition through leaderboards. Similarly, Dehganzadeh, Fardanesh, Hatami, Talaee, and Noroozi (2019) in their review of the implantation of gamification in English as a Second Language (ESL) found positive results in terms of motivation and interaction. They recommended that more studies are needed to explore the interaction between gamification elements and language learning. More research has to be conducted to investigate which gamification elements influence students’ language proficiency and learners’ styles, preferences, and characteristics. Dehganzadeh and Dehganzadeh (2020) also highlighted that many researchers were interested in investigating Duolingo as a significantly popular gamified in MALL environments in language learning. Crowther, Kim, and Loewen (2017) analyzed 34 hours of students’ interaction on Duolingo and recommended using Duolingo as a supplemental learning tool to advance language learning. Lotze (2019) investigated the use of Duolingo as a mobile-homework tool and found that Duolingo developed students' language levels and boosted their motivation.

Duolingo’s design and usability

The majority of Duolingo’s users reported their overall satisfaction with the application in terms of its usability and interactivity. They considered Duolingo as one of the best language platforms in terms of the high quality of the content, pedagogical coherence of the skills and the language activities, the usability of menus and icons, the customization of settings to meet learners’ individualized needs, the provision of feedback and self-correction, the motivating elements to engage learners, and the sharing of learning outcomes and progress (James & Mayer, 2019). In evaluation of language learning apps, Chen (2016) found that Duolingo provides adequate writing activities and dictation for beginners and offers oral practice for advanced learners. With the existence of a dictionary, learners can access vocabulary translation.

One effective feature in Duolingo is spaced repetition, which depends on algorithms that recognize the learners' need to revise specific words/chunks. Moreover, Duolingo offers several activities to enhance retention and versatility, like writing words that learners hear or matching words to pictures. The desktop version of Duolingo contains "trees" (nodes that contain specific skills or topics) to be mastered through some lessons. These nodes change color to reflect the progress of the learner through these lessons or skills. Jiang, Rollinson, Plonsky, and Pajak (2020) stated that it is noteworthy that Duolingo's courses align with the Common European Framework of Reference (CEFR). This is apparent in its communicative curriculum and functional language. Additionally, the application uses algorithms to provide individualized instruction through taking placement tests, giving instant feedback, and offering practice lessons. Therefore, the number of sessions that learners complete, the portion of content they cover, and the amount of time each learner spends varies based on their levels of autonomy and learning abilities (Putri & Islamiati, 2018).

Each course in Duolingo is structured to begin with a unit number and end with a checkpoint. Skills/topics discuss communicative topics (e.g., vocabulary and expressions related to shopping) and grammar skills that are presented in a functional way. Learners can either take a progress test and be placed at their proper level, or they can learn starting from unit 1. Learners can also attempt practice sessions to review the content they covered throughout the course. "Stories" are useful to provide discourse-based reading and listening (Niah & Pahmi, 2019). To motivate learners, Duolingo offers "Lingots" (Duolingo's awards) that learners get if they complete a node or keep studying for a streak of days. Learners can also buy outfits for the Duolingo owl, get a progress quiz, or obtain a "freeze streak" so that they won't miss a streak if they haven't studied for a day.

Each skill is covered through one to eleven lessons. Once learners complete a lesson, they receive 10 experience points (XP) (Duolingo points). Learners obtain a point for each correct response and lose a point for a wrong answer. The app not only provides the right answers but also offers useful tips to enhance the learning experience. Learners complete a lesson when they gain 10 points. In the "Activity" stream, learners can follow other classmates or learners, and they can follow them back. The learners' XP is shown in a "leaderboard list", so that they can follow their rank and progress. Additionally, learners can post questions or comments in the "Discussion" forum, with the most popular discussions being first on the list (Lenkaitis, 2019; Putri & Islamiati, 2018). Figure 1 demonstrates some of Duolingo's features, like lingots, streaks, units, skills, and XPs.

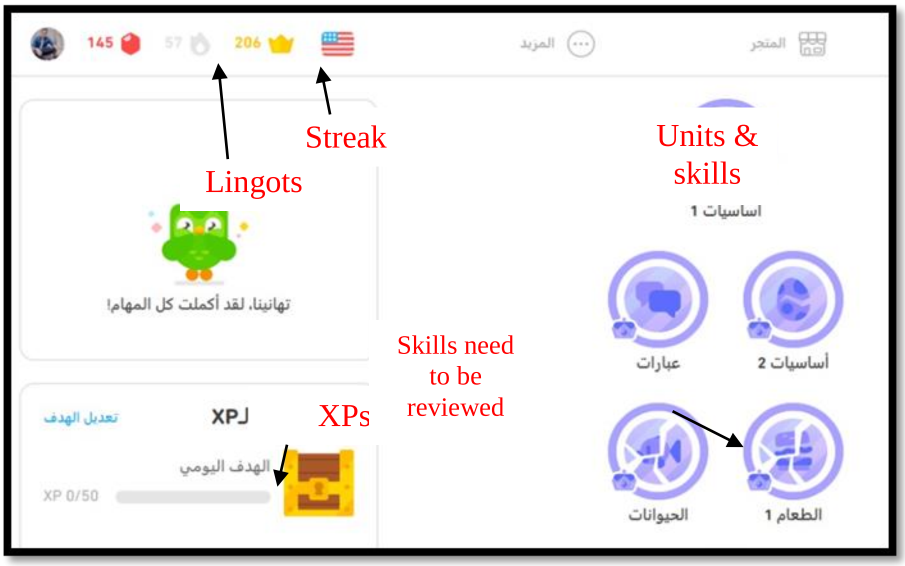

145
57
206
المزيد
المتجر
Streak
Lingots
Units & skills
اساسيات 1
تهانينا، لقد أكملت كل المهام!
Skills need to be reviewed
XPs
تعديل الهدف
XPل
الهدف اليومي
XP 0/50
عبارات
أساسيات 2
الحيوانات
الطعام 1

Figure 1. Duolingo's interface and features

In 2015, Duolingo for Schools was created as a free service for teachers to keep track of their students' logs and interactions with the app. Teachers can create a class and receive weekly reports for each student to track their learning progress and activities. Students can join by clicking on a link. Teachers may keep track of their students' progress using the dashboard, which displays the amount of time they spent performing activities, the lesson they finished, and the XPs they earned (Munday, 2016). The mobile version, on the other hand, simply has trees, XPs, a course counter and daily streak, translation,discussion, Lingots, and a leaderboard (Putri & Islamiati, 2018).

However, Duolingo has been criticized since it relies on traditional learning methods such as grammar translation and Second Language Acquisition through translation, repetition, and dictation tasks. According to Hall and Cook (2012), students learn through form-focused and meaning-focused activities such as translation tasks. According to Munday (2016), Duolingo's dictation activities are brief and are followed by immediate feedback. Students' pronunciation, comprehension, and accuracy all improved as a result of repetition exercises. Similarly, users may find activities monotonous and rely on translation. Only a small percentage of users utilize the grammatical explanations or engage in the discussion forums (Marques-Schafer & da Silva Orlando, 2018).

In light of these features, Duolingo has a number of advantages as a language learning tool. To begin with, it includes gamification components, which are both inspiring and engaging. Second, learners have enough time to study lessons and practice language elements if homework is offered. Third, both teachers and students can use Duolingo within and outside of the classroom. Duolingo also provides explanations of new vocabulary and grammatical structure recommendations, allowing students to learn at their own pace. Meanwhile, due to a lack of internet connectivity, implementing Duolingo in the classroom may be problematic. Hence, teachers must plan ahead of time to incorporate Duolingo activities into their lessons and allocate adequate time.

Duolingo and EFL Speaking

Speaking is a productive language skill that requires effective communication to convey thoughts and emotions. Richards and Rodgers (2014) describe speaking as an interactive skill that allows listeners and speakers to use the appropriate language that is suitable for the context and aim of the communication. To effectively communicate with others, EFL students must be confident and competent. Samad, Bustari, and Ahmad (2017) state that speaking involves five subskills: comprehension, grammar, vocabulary, pronunciation, and fluency. Comprehension refers to listeners' or readers' abilities to understand the target language adequately, whether spoken or written, in various situations. While grammar combines structural rules that contribute to the formation of sentences and words, vocabulary is the ability to select suitable words for the context to express ideas and actions. Moreover, pronunciation describes how sounds are pronounced and received by listeners. Fluency represents speakers' ability to speak without facing communication breakdown in a smooth, natural, and simple way that demonstrates their ability to use vocabulary, grammar, and pronunciation effectively (Maulidar, Gani, & Abdul Samad, 2019).

El-Sawy (2013) and Gudu (2015) assert that EFL speaking is not given proper attention in terms of learning and teaching. Findings of classroom observations conducted by Khan (2013) revealed that traditional teaching methods, intensive use of L1, teachers' inadequate knowledge of students' speaking problems, and teacher-centered classes negatively influenced EFL students' speaking subskills (accuracy, fluency, and functions). Afshar and Asakereh (2016) examined EFL Iranian university students' speaking problems from both students' and teacher's perspectives. The researcher utilized a questionnaire to identify speaking problems. Results showed that social context, EFL teachers, insufficient resources, and the content and teaching activities were among the factors that negatively affected students' speaking performance.

Alfuhaid (2021) examined the effect of using Duolingo on secondary school students' speaking proficiency in Saudi Arabia. T-test results showed that experimental group significantly outperformed control group in speaking proficiency. He concluded that Duolingo improved EFL students' speaking skill, enhanced their attitude, and reduced their speaking anxiety. Mahbub, Romsi, Bulqiyah, and Firdaus (2020) conducted an exploratory study to investigate EFL teachers' and students' perceptions of using Duolingo to improve EFL speaking. A questionnaire and interviews were administered to an instructor and 10 high school students in Indonesia. It was found that participants perceived using Duolingo positively as it helped them manage the classwork and assessment. Similarly, Niah and Pahmi (2019) explored the effectiveness of using Duolingo on 58 EFL eighth-grade students' speaking and listening. The results showed that the students' speaking and listening skills improved after using Duolingo. Loewen, Crowther, Isbell, Kim, Maloney, Miller, and Rawal (2019) investigated using Duolingo with Turkish EFL students to improve speaking skills. Results revealed a positive, moderate correlation between time students spent using Duolingo and achievement. The participants perceived Duolingo as being flexible and motivating.

Shortt et al. (2021) conducted a systematic review on gamification in MALL in language learning and concluded that research in MALL platforms and pedagogies is still in its early stages. More research is needed to enrich the gamification in MALL with innovative applications (Dehganzadeh & Dehganzadeh, 2020; Shadiev et al., 2020). While many researchers have explored gamification implementation in EFL classrooms, few studies have investigated the effect of gamification in MALL on students' speaking skills.

Foreign Language Enjoyment (FLE)

Second Language Acquisition (SLA) and Foreign Language Learning (FLL) have been influenced by the emergence of Positive Psychology (PP) and Fredrickson's (2001 and 2003) Broaden-and-Build theory and Pekrun and Schutz (2007) control-value theory. The broaden-and-build theory emphasizes that positive emotions are fostered in the "thought-action repertoires of individuals and contribute to the construction of their personal resources and psychological resiliency" (Shirvan & Taherian, 2020, p.2). The control-value theory considers enjoyment as a positive factor that affects the learners' academic achievement. According to Seligman and Csikszentmihalyi (2000), research in PP aims at exploring positive institutions, positive personal traits, and positive experiences. Dewaele and MacIntyre (2016) argue that positive emotions significantly support students' foreign language learning, promote students' language input consciousness, and develop their noticing skills. Dewaele and MacIntyre (2014) define enjoyment in the field of foreign language learning as a sense of joy towards peers, teachers, and the language learning experience. Research in FLE (Boudreau et al. 2018; Dewaele et al. 2018; Saito, Dewaele, Abe, & In'nami, 2018) explored the affordances of FLE and the contextual factors that teachers perceive to be pivotal in enhancing FLE.

Recent research investigated FLE and its effect on Foreign Language Anxiety (FLA), the constructs of FLE and FLA, the role of FLE in predicting language performance, and the role of teacher-student relations in the microsystem of the EFL context. Dewaele and MacIntyre (2014) examined students' attitudes towards foreign language enjoyment and concluded that teachers' professional skills and emotional support enhanced students' enjoyment. Participants reported enjoyment in terms of teachers' respect, praise, and positive emotions. In a mixed-methods study, Jiang and Dewaele (2019) explored EFL Chinese students' enjoyment, and the variables related to their teachers. Results showed that teacher-related factors contributed the most to students' FLE compared to factors related to students. Likewise, Dewaele et al. (2018) explored the FLE episodes and found that teachers played a vital role in promoting students' enjoyment. They found that teachers' friendliness contributed by 20% to the enjoyment of students when learning a foreign language.

Foreign Language Anxiety (FLA)

Krashen (2002) indicates that anxiety builds an affective filter that prevents learners from receiving the learning materials and blocks language development. Crookall and Oxford (1991) and Horwitz (2001) conclude that anxiety diminishes target language proficiency, retention, and production. Scovel (1978) defines anxiety as a complicated process of feelings and personality traits. In the case of personality traits, anxiety is temporarily demonstrated in various life situations with some physical symptoms. With situation-based anxiety, learners experience anxiety on specific occasions, like when speaking a second language. This type of anxiety depends on the situation as well as physical and psychological conditions. According to Horwitz, Horwitz, and Cope (1986), FLA is "a distinct complex of self-perceptions, beliefs, feelings, and behaviors related to language learning arising from the uniqueness of the (foreign) language learning process" (p. 128).

Alpert and Haber (1960) pinpoint that anxiety may be classified into two categories: facilitative and debilitative. While facilitative anxiety can have a motivating effect on academic performance, debilitative anxiety may negatively impact EFL speaking and is manifested in students' reluctance to participate in speaking activities, forgetting words, and losing concentration. Debilitative anxiety may have psycholinguistic and physiological symptoms. Oxford (2005) refers to some symptoms that express anxiety, including avoidance, arriving late or missing classes, difficulties in producing L2 sounds, or physical symptoms like shaking, forgetfulness, dry mouth and throat, sweating, blankness, and headache. MacIntyre and Gardner (1991) contend that anxious learners perceive the second language (L2) learning experience as an uncomfortable one. Therefore, they tend to avoid participation in the learning situations that constitute social pressure on them.

Horwitz et al. (1986) assert that language anxiety is more common among learners who are afraid of communicating with people "Communication Apprehension" (CA), receiving negative assessment (negative evaluation), or failing a test ("text anxiety"). Communication apprehension, as the main cause of language anxiety, is associated with language usage. Horwitz et al. (1986) associated FLA with shyness and a fear of communicating with others. Mon (2019) argues that CA is a personality trait that occurs on different everyday occasions. The second type of anxiety, fear of negative evaluation, is related to CA as it appears in many social situations in which the individual is assessed, like in interviews or speaking in EFL classes. On the other hand, text anxiety refers to the type of fear that is context-based and stems from failing exams. Fear of negative evaluation and test anxiety are pervasive in language classrooms. Students are afraid of being evaluated, making mistakes, and being laughed at when they speak in front of their peers or teachers.

Furthermore, Kayaoğlu and Sağlamel (2013) found that linguistic factors such as word choice, grammar, and pronunciation problems increased Turkish EFL students' anxiety level. It was also found that factors that increase anxiety include boring language activities, teacher-centered classes, competitive class atmospheres, shyness, low self-esteem, time management problems, and inadequate teaching materials. McCroskey (2015) concluded that lack of confidence and fear of peer evaluation affect language anxiety. Even if speakers have an adequate level of the language, lack of self-confidence, inadequate preparation, and low self-efficacy cause speakers to underestimate their abilities (Horwitz, 2001). As a result, anxious students may avoid participating in class activities that they perceive to be risky or threatening. Additionally, external factors like the learning environment and teacher's role can affect language anxiety. The more engaging the activities and content, the less the level of students' language anxiety. Teachers' roles and teaching styles significantly affected students' anxiety (Siyli & Kafes, 2015). Ellis (2015) indicates that students' perceptions and beliefs about language learning experiences, teacher-student interactions, and the type of classroom management influence their anxiety level.

Casado and Dereshiwsky (2001) propose that FLA can be measured by behavioral tests in which reactions are observed, self-report tools to record internal feelings, or physiological tests to check the heart rate, blood pressure, etc. Horwitz et al. (1986) developed the Foreign Language Anxiety Scale (FLCAS) to measure language learning anxiety. It consists of three domains: communication apprehension, test anxiety, and fear of negative evaluation. Furthermore, Aida (1994) designed FCLAS to explore speech anxiety, fear of failing, anxiety of speaking with natives, and negative attitudes towards language. MacIntyre and Gardener (1994) criticized the idea of focusing only on the anxiety associated with the output stage of producing the language. Hence, they created an instrument that measures anxiety at the various stages of language learning, input, processing, and output. AlSaraj (2014) examined anxiety in a Saudi context with female EFL students. She investigated the suitability of the FLCAS in her context and designed an Arabic Foreign Language Anxiety Questionnaire (AFLAQ) to explore the causes of anxiety among female students. Likewise, Şimşek and Dörnyei (2017) investigated language anxiety from the L2 Motivational Self System and its relation to students' self-concept. They categorized learners in terms of L2 students' self-system into "fighters" who constructively control anxiety, "quitters" who give up control of their anxiety, and "safe players" who utilize safety-seeking actions to eliminate or avoid using the target language.

Foreign Language Speaking Anxiety (FLSA) in EFL Classrooms

Speaking in a foreign language is considered the most anxiety provoking activity (Curry et al., 2020; Mukminin et al., 2015). Therefore, it is critical to investigate the effect of speaking anxiety on students' oral performance in FL contexts. One of the aims of the current study is to incorporate effective technological tools to alleviate speaking anxiety and enhance students' motivation and speaking performance. Many researchers have investigated the impact of various technological-based tools (Bashori Hout, Strik, & Cucchiarini, 2020; Chen, 2016; Korucu-Kis & Sanal, 2020) and found that such tools positively reduce speaking anxiety.

Mata-analyses conducted by Teimouri, Goetze, and Plonsky (2019) and Botes, Dewaele, and Greiff (2020) emphasize the role that foreign language anxiety plays on learners' performance. On the other hand, Golonka, Bowles, Frank, Richardson, and Freynik (2014) highlight the impact of positive affective factors resulting from utilizing Automatic Speech Recognition (ASR) on students' motivation and confidence in EFL classes. Ishikawa, Takamichi, Umemoto, and Nishiyamaet (2021) found that speaking anxiety was decreased after using Text-To-Speech (TTS) technology. They also reported that students' self-efficacy toward delivering presentations in English increased.

In their quasi-experimental study, Bashori, et al. (2021) examined the effects of using two ASR websites on developing EFL secondary school students' vocabulary, reducing speaking anxiety, and promoting language enjoyment. Two experimental groups used the ASR-based websites, while the control group received regular lessons. Results showed that the experimental groups' students significantly outperformed the control group students in learning EFL vocabulary. The intervention was effective in reducing the speaking anxiety levels of the experimental groups' students and boosting their language enjoyment. Furthermore, Asik and Gokce (2019) investigated the factors that impact the speaking anxiety of tourism students and the influence of demographic variables. Data were collected from 376 students through a questionnaire. Results indicated that tourism students' speaking anxiety was above the average. It was also found that gender was a significant factor for speaking anxieties, as females were more anxious than males. However, no significant differences were found for other variables like age and language proficiency.

Moreover, Mukminin, et al. (2015) investigated the factors that caused speaking anxiety among high school students in Indonesia. Qualitative data from interviews and demographic profiles were analyzed. The results revealed that lack of vocabulary and grammar, fear of negative comments, low self-esteem, fear of the teacher's evaluation, and cultural factors significantly affected students' speaking anxiety. A negative correlation was also found between participants' perceived competence in their EFL speaking, their actual speaking competence, self-efficacy, and -in-class speaking apprehension. However, a positive correlation was found between speaking anxiety and some factors like age, perceived difficulty of speaking, and teaching experience.

Melouah (2013) reports that EFL students' linguistic complications were one of the factors behind their speaking anxiety. Mak (2011) identified stressors that affect speaking anxiety and summarized them as "speech anxiety and fear of negative evaluation; uncomfortableness when speaking with native speakers; negative attitudes towards the English class; negative self-evaluation; and fear of failing the class/consequences of personal failure" (p. 207). Moreover, Gkonou (2014) found that there was a correlation between language anxiety and speaking anxiety among Greek EFL students. He also found that fear of social evaluation stemmed from peers and teachers.

Moreover, Sho (2020) conducted action research to investigate the anxiety that EFL high school students in Japan experience while speaking English and how using synchronous videoconferencing decreases students' speaking anxiety. Thirty-four students were assigned to two experimental groups: an improvisation group and a script group. A questionnaire was administered twice to collect data. The results showed that the participants reported high levels of anxiety about speaking. The improvisation group outperformed the script group in reducing speaking anxiety. Moreover, Gani, Fajrina, and Hanifa (2015) and Leong and Ahmadi (2017) explored the effect of advanced language proficiency on speaking anxiety and the factors affecting speaking anxiety. Findings revealed that most participants were anxious during oral activities and dissatisfied with their fluency, vocabulary, pronunciation, and ideas. It was also found that being asked to speak spontaneously, peers' evaluation, and communication with native speakers were the factors that highly affected speaking performance.

Macayan (2018) investigated the impact of speaking anxiety on EFL university students' productive skills. Results from analyses of FLCAS showed that debilitating anxiety influenced students' speaking and writing. Ahmed (2017) examined the factors that increase speaking anxiety among EFL Pakistani students. Results showed that inter-language meaning systems and fear of making mistakes were the main sources of speaking anxiety. Likewise, Dincer and Yesilyurt (2013) explored the beliefs of EFL students about EFL speaking. Findings showed that some students perceived speaking in English as an anxiety-provoking experience.

Research has shown that there is a dynamic short-term or long-term relationship between FLE and FLA (Boudreau, MacIntyre, & Dewaele, 2018; Dewaele & MacIntyre, 2014; Saito, et al., 2018). Dewaele and MacIntyre (2014) collected data from 1746 multilingual language learners from more than 90 countries. They found that enjoyment and anxiety co-exist and are negatively associated with each other. Saito et al. (2018) found that Foreign Language Enjoyment (FLE) proved to be effective in supporting FL students in learning the target language (Saito, et al., 2018). To measure the levels of FLE and positive emotions towards language learning experiences, Dewaele and MacIntyre (2014) created a 21-item foreign language enjoyment scale. On this scale, they added 8 items to test FLA. The results of administering this scale showed that there was a moderate correlation between FLE and FLA. Female participants had higher levels of FLE and FLA compared to their male counterparts. More proficient students reported higher levels of FLE and lower levels of FLA.

The majority of studies on FLE and FLA have been conducted in Asian countries (Dewaele & MacIntyre, 2014; MacIntyre, Dewaele, Macmillan, & Li, 2019). Thus, Jiang and Dewaele (2019) conducted a mixed-method study to investigate the FLE and FLA of 564 EFL undergraduates in China and how they differ from non-Chinese students. The results showed that Chinses and non-Chinses had similar FLE levels but not FLA levels, which were higher for Chinse undergraduates. However, Chinese students reported their dissatisfaction with teachers' unexpected behaviors. While teacher-related factors were more powerful predictors of students' FLE, learner-internal factors significantly predicted students' FLA.

In a similar vein, Dewaele, MacIntyre, Boudreau, and Dewaele (2016) explored the influence of gender on FLE. They found that females reported a higher level of enjoyment and felt prouder than males in the FL class. Findings also showed that females experienced moderate FLA more than males. Female participants reported more worry about making mistakes and being less confident in speaking English. Qualitative data analysis showed that FLE is affected by good grades as they increase students' confidence and pride; collaborative learning; and using games.

Dewaele et al. (2018) identified the impact of learner-internal and teacher-related factors on secondary school students' FLE and FLA in London. Participants were learning French, German, or Spanish as a FL. It was found that female participants had higher levels of FLE and FLA than male peers. Students' FLA levels were not significantly affected by teacher-related variables. The more positive emotions that students feel while learning a FL, the lower the levels of FLA that they experience. The researchers also identified some factors that boosted FLE, such as positive attitudes towards learning a FL, the teachers' behaviors, the frequency of using the FL, the duration of the speaking time, and the advanced level of language. Additionally, Dewaele and Dewaele (2017) used a pseudo-longitudinal design to explore the effect of age on FLE and FLA. The results indicated a slight difference in FLA and a small increase in FLE among the age groups. Moreover, there was a negative correlation between FLE and FLA. The results revealed that teacher-related variables have an ongoing impact on FLE and not FLA.

Furthermore, Mendez and Fabela (2014) conducted a qualitative study to investigate how emotions affected 18 Mexican EFL students. They concluded that emotions experienced by students in their language learning process were affected by their motivation and social and cultural factors. Li, Jiang, and Dewaele (2018) created a version of the Foreign Language Enjoyment Scale that suits the Chinese context. They administered the scale to 2078 Chinese secondary school students and found that the FLE-Teacher domain had the highest significance on students' enjoyment. Li et al. (2019) further investigated the correlation between FLE, FLA, and students' achievement. Results showed that FLA and FLE predicted students' achievement. While the main source of FLA was the fear of teachers' reactions to students' mistakes, receiving good grades, and teacher's praise were found to be significant in students' FLE. Moreover, Li et al. (2018) identified some learner-internal and learner-external variables that affect FLE. Learner-internal factors involve a sense of accomplishment, achievement, pride in doing challenging tasks, and being creative and able to control external factors. On the other hand, learner-external variables include teacher and peers' appreciation and support, group harmony, and collaborative social activities.

Based on the previous review of literature on using Duolingo and the growing body of studies that tackled speaking anxiety and foreign language enjoyment, it is concluded that research in this area is limited and not much has been done to explore students' emotions when speaking in EFL classrooms. The purpose of this study was to investigate the relationship between these two variables in the context of EFL in Egypt. Additionally, the present study focused on the impact of Duolingo on EFL students' speaking performance.

Method

Participants

Two intact classes of second year in a public female preparatory school in Gharbia, Egypt were randomly chosen to take part in this study. The sample consisted of 60 female participants who were randomly assigned into two groups: control and experimental (30 students in each group). The average age of the students was 13.61 years. Before the experiment, they were asked to do a free online English test by the British Council, and their language level was beginner to pre-intermediate. They had three periods per week (225 minutes in total); two sessions (90 minutes each) and one session (45 minutes). All participants have studied English for seven years as a FL. Participants shared the same demographic background; all were Egyptians whose native language was Arabic, and they had nearly the same socio-economic background.

Instruments

The FLE and FLSA questionnaire

The researcher adapted Dewaele and MacIntyre's (2014) short-form questionnaire to measure FLE and FLSA. The first section of the questionnaire involves three questions about the demographics of the participants (name, age, and languages known). The second section contains 18 items and requires the participants to express their agreement on a 5-point Likert scale in which strongly disagree = 1, disagree = 2, neither agree nor disagree = 3, agree = 4, and strongly agree = 5. While 10 positively phrased items describe foreign language enjoyment, 8 items measure participants' speaking anxiety (6 items express high anxiety and 2 reverse-coded items reflect low anxiety). The researcher adapted the items related to foreign language anxiety and enjoyment to suit the speaking skills and the EFL classes. The final section comprised two open-ended questions that asked participants to describe in detail a specific event or episode in the English class when they felt enjoyment and an event in which they felt anxious. The questionnaire was translated into Arabic by a professional bilingual (Arabic-English) translator. To check the reliability of the questionnaire, the researcher used the test re-test method by first administering the questionnaire to a pilot group (23 participants in another preparatory school) and then re-administering the test to the same group after two weeks. The Pearson correlation coefficient between the two administrations showed a high correlation for the FLE items (0.78) and for the FLSA items (0.88). To measure the content validity, the questionnaire was submitted to 5 jurors in TEFL and a few comments to simplify two items were made. The final version of the questionnaire was created on a Google Form and the link was sent to students by the schoolteacher through a WhatsApp group.

Speaking tests

After reviewing the literature and analyzing the second year preparatory school book "New Hello," the researcher identified the speaking skills and activities addressed in this course. The researcher prepared a checklist with the suggested speaking skills suitable for the second year preparatory course. The researcher submitted the checklist to the jurors, and after receiving feedback, the researcher finalized the skills as follows:

- Content includes detailed comprehension, appropriateness of ideas, and the ability to share content easily within a specific timeframe.
- Pronunciation is the process of producing comprehensible pronunciation and accurate sounds to express meaning. This included segmental and supra-segmental features and the quality of voice.
- Vocabulary is the ability to choose relevant words related to the topic of speech and use them appropriately.
- Grammatical accuracy is the ability to use grammatical rules correctly in terms of quantity and quality.
- Fluency involves utterance length, rate of speech, and the continuity of thoughts in a spontaneous, clear, and comprehensible way.

Consequently, the researcher prepared the speaking tests by considering the suggested subskills. The researcher followed the following steps in preparing the speaking tests:

1. The researcher reviewed the literature concerning speaking tests and identified the types of questions that are suitable for assessing the speaking skills in the current study.
2. The researcher set the objectives of the speaking test, considering the speaking skills that the study aimed to develop.
3. A table of specifications was developed to specify the target skills, the type and number of questions to evaluate each skill, the time allotted for each question, and the total time of the test.
4. Two equivalent forms of the speaking test were created. The initial forms were submitted to jurors in TEFL, EFL teachers, and supervisors to check the content validity and suitability of the tests. Received comments were considered, and the test was modified to be simple and clear.
5. To measure the reliability of the tests, the researcher piloted the tests on the pilot group. Considering the rubric, the researcher and

another rater scored the participants' responses. Responses were recorded, transcribed, and scored to check inter-rater reliability. The Pearson Product Moment Correlation was calculated, and the inter-rater reliability was (Cohen's = 0.83, 92%), which shows a strong correlation.

Each test consisted of three sections with eight questions each. The first section invited the examinee to take a minute to read three questions about himself or herself and respond within a minute. In the second section, the examinee was given a card that contained three open-ended questions about a specific topic (family and friends, and holidays). The examinee took a minute to read the questions and prepare, and two minutes to attempt the questions. In the third section, examinees were given a minute to look at a picture and read two guided questions, then describe the picture in two minutes. All the speaking topics were selected from topics similar to those in the school book to ensure that students are familiar with them. The total time of the test for each examinee was 8 minutes. Participants' answers were recorded and assessed by the panel with blind evaluation as students were given codes.

Speaking rubric

The researcher adapted Alfehaid's (2018) analytic rubric, which comprised a 5-point scale on which each subskill was graded out of 10, wherein (0-2= inadequate, 2-4= needs improvement, 4-6= acceptable, 6-8 = meets expectations, and 8-10 = distinguished). The initial form of the rubric was submitted to the jurors to check validation. For the reliability of the rubric, the inter-rater coefficient of agreement was calculated between the two raters and it was found to be (88%), which shows high reliability.

Semi-structured interviews

After analyzing students' responses to the two sections of the questionnaire and the speaking tests, twelve students from the experimental group were purposefully selected to take part in the interviews. Two interviewees who managed to complete the assigned lessons in Duolingo and scored the highest in the enjoyment section of the questionnaire were selected for the interviews. Two students who achieved the lowest scores in the enjoyment questionnaire were also recruited for the interviews. Four students were selected based on their scores on the FLSA section of the questionnaire (two who scored the lowest and two who scored the highest). Additionally, four students were invited to the interviews based on their speaking scores (two who scored the highest and two who scored the lowest). Interviews were carried out in Arabic and took place at the school computer lab. The researcher and the schoolteacher constituted the panel for the interviews. The researcher created five questions to explore the contribution of Duolingo to students' speaking skills, foreign language enjoyment, speaking anxiety, the challenges that students had in using Duolingo, and students' intension to use Duolingo after the experiment. The researcher recorded the oral responses and transcribed the audio files into text. The validity of the interview questions was proven by the panel of TEFL professors. Then the interview questions were piloted to examine their relevance and clarity and decide the estimated time per interviewee. Ten minutes were suitable for each interviewee.

Study Design and Procedures

The current study used the mixed-methods design. The researcher carried out the pre-and post-speaking tests and the questionnaire twice for the experimental and control groups. With the coordination and supervision of the researcher, the schoolteacher taught the two groups. While the experimental group was instructed to use Duolingo along with the speaking activities in the school book, the control group practiced the activities in the school book during class time. The study was carried out during the first semester of the academic year 2021–2022 and lasted for ten weeks (from mid-October to the end of December). None of the students in the experimental or control groups had previous knowledge of using Duolingo.

The participants took the questionnaire and the speaking tests at the beginning and end of the experiment (week 1 and week 10). Interviews were conducted after the experiment. Before taking part in this study, the participants were informed about the aim of the study and signed a consent letter. The researcher met the schoolteacher before the study and oriented her on using Duolingo and creating a class on Duolingo for schools using the web. The experimental group students were oriented by the researcher and the teacher on how to use Duolingo. The teacher sent students a link for the Duolingo class so that they could log in using their emails. Students were asked to download Duolingo to their smartphones or tablets. They were instructed to start from the first level to make sure that all students were exposed to the same materials and skills. The teacher shared with students their weekly progress, the time they spent on Duolingo, and the skills they covered. The current study is limited to trees and XPs features on Duolingo. Students in the present study were required to do these activities:

- Write a word in response to a given picture.

- Translate a sentence into the learner's native language and vice versa.
- Match words to pictures or pairs of words together.
- Order the scramble words to form a sentence.
- Choose the right translation for a given sentence.
- Record a sentence that student reads, and the voice recognition feature detects the accuracy of the pronunciation.
- Do multiple-choice word recognition exercises.
- Write a sentence that the student hears (the student can choose between the normal and slow speed).

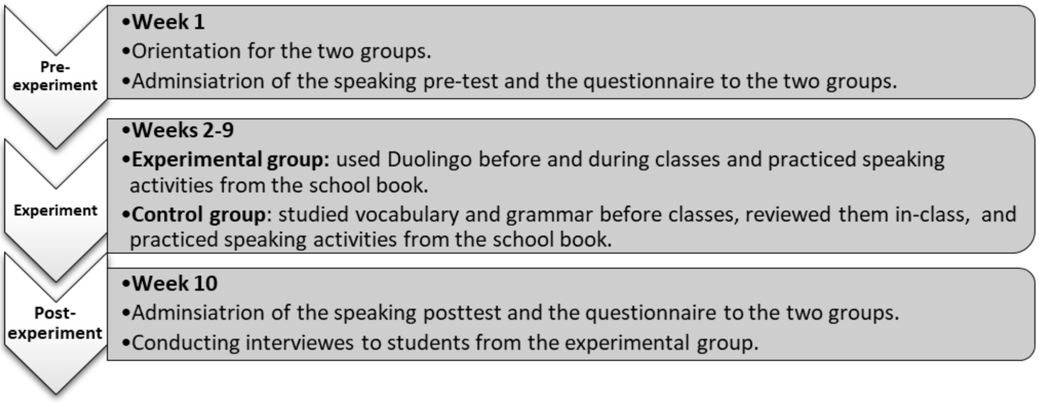
In addition to the regular classes, students in the experimental group were instructed to use Duolingo at home to complement what they studied at school. They were required to complete five Duolingo lessons weekly or an hour per week. During the period of the study, students in the experimental group were required to complete 2 units and 27 skills. The study covered four units from the school book (units 2, 3, 4, and 5). In this study, the lessons in Duolingo were intended to complement school course as shown in Table 1. During the classes, the teacher connected her mobile device to the interactive whiteboard through a software application to display the activities on Duolingo to the screen. She encouraged students to work as a whole class to use the touch screen feature to interact with the game-based activities. After revising the target language, the teacher tackled the speaking activities in the school book. The speaking activities in the school book are integrated with listening and reading activities, in which students listen and read then speak.

Table 1.

The outline for the lessons/skills from Duolingo and school book

Duration	School book speaking skills & topics	Duolingo content/skills
2 weeks (Weeks 2 & 3)	Unit 2 (describing weekend activities & describing a photo)	Unit 1: Basics 1 & 2, phrases, food, animals, plural, possessions, pronouns, and clothes & food.
2 weeks (Weeks 4 & 5)	Unit 3 (discussing family history)	Unit 2 (skills 1-6): Family, present tense, colors, questions, prepositions, and dates and times.
2 weeks (Weeks 6 & 7)	Unit 4 (describing places, debating about tourism, asking for information through phone).	Unit 2 (skills 7-10): Adjectives, adverbs, places, and jobs.
2 weeks (Weeks 8 & 9)	Unit 5 (describing acts of kindness, making suggestions, and discussing jobs in houses).	Unit 2 (skills 11-16): Things, people, travel, numbers, education, and past tense.

The teacher provided students in the control group with a printed list of vocabulary and target grammar (same vocabulary and grammar as in Duolingo's units) to study before the class. During class time, the teacher reviewed the vocabulary and grammar assigned to students and addressed the speaking activities in the school book. Therefore, students in the two groups were exposed to the same language skills before the class and revised them during class time then practiced the same speaking activities in the school book. Figure 2 represents the study procedures and design.



- **Week 1**
- Orientation for the two groups.
- Adminsiatrion of the speaking pre-test and the questionnaire to the two groups.

- **Weeks 2-9**
- **Experimental group:** used Duolingo before and during classes and practiced speaking activities from the school book.
- **Control group**: studied vocabulary and grammar before classes, reviewed them in-class, and practiced speaking activities from the school book.

- **Week 10**
- Adminsiatrion of the speaking posttest and the questionnaire to the two groups.
- Conducting interviewes to students from the experimental group.

Figure 2. The study procedures

Data Analysis and Results

The quantitative data obtained from the tests and the questionnaire were analyzed using SPSS V.22. The first question was answered by implementing independent samples t-tests. The second and third questions were answered by comparing the descriptive statistics and t-test results. To answer the fourth research question, the researcher ran the Pearson product-moment to explore the relationship between the variables. To analyze students' responses to the open-ended questions and the interviews, the researcher used Nvivo 10. The results of quantitative data analyses are discussed in the light of the research hypotheses. Qualitative data results are presented in a separate section and classified into themes.

Quantitative data analysis:

Hypothesis one: There is a statistically significant difference between the experimental group and the control group's mean scores on the post-speaking test in favor of the experimental group.

The researcher checked the homogeneity of variance using independent samples t-test and Levene's test for equality of variance of the two groups on speaking pre-test. The results obtained are presented in table 2.

Table 2.

Independent samples t-test for the control and experimental groups on the speaking pre-test

	Levene's Test for Equality of Variances			t-test for Equality of Means						
Groups	N	M	SD	t	df	Sig.	Mean Difference	Std. Error Difference	95%of Confidence Interval of the Difference	
									Lower	Upper
Control Group	30	26.87	4.918	1.209	58	.232	1.533	1.269	-1.006	4.073
Experimental Group	30	25.33	4.908							

As shown in table 2, there was no statistically significant difference between the control group (M=26.87; SD=4.918) and the experimental group (M=25.33; SD=4.908; t=1.209, p>0.05) on the pre-test. Therefore, the groups were very similar in their speaking skills before the experiment. The researcher performed the independent samples t-test to compare the mean scores of the speaking posttest for the two groups according to the speaking sub-skills. Table 3 displays this result.

The results shown in table 3 indicated a statistically significant difference between the mean scores of the speaking posttest of the control group (*M*=27.23, *SD*=4.703) and the experimental group (*M*=43.13, *SD*=4.232) in favor of the experimental group. Hence, hypothesis one was retained.
Additionally, the results indicated a significant difference between the control group (con.) and the experimental group (exp.) on the speaking subskills in favor of the experimental group as follows: content (*M*con.=4.93; *M*exp.=7.03; *p*<0.05); vocabulary (*M*con.=5.13; *M*exp.=7.73; *p*<0.05); pronunciation (*M*con.=4.87; *M*exp=7.70; *p*<0.05); accuracy (*M*con.= 5.72; *M*exp.=7.27; *p*<0.05); and fluency (*M*con.= 5.73; *M*exp.=6.73; *p*<0.05). The effect size of the speaking posttest of the experimental group in comparison to the control group was found to be medium (Cohen's *d*=3.9).

Table 3.

Independent samples t-test for the control and experimental groups on the speaking posttest

	Control groups (*N*=30)		Experimental groups (*N*=30)		Levene's Test for Equality of Variances		t-test for Equality of Means		
Speaking subskills	**Mean**	**SD**	**Mean**	**SD**	**F**	**Sig.**	**t**	**df**	**Sig. (2-tailed)**
Content	4.93	.583	7.03	1.159	22.228	.000	-8.864	58	.000
Vocabulary	5.13	1.279	7.73	1.015	.544	.464	-8.721	58	.000
Pronunciation	4.87	1.224	7.70	1.088	.150	.700	-9.477	28	.000
Accuracy	5.72	.828	7.27	1.721	19.610	.000	-5.737	58	.000
Fluency	5.73	.765	6.73	1.285	5.715	.020	-5.006	58	.000
Overall speaking	27.23	4.703	43.13	4.232	.400	.530	-13.765	58	.000

* $p < 0.05$

Hypothesis two: There is a statistically significant difference between the experimental group and the control group's mean scores of language enjoyment on the post-implementation of the questionnaire in favor of the experimental group.

To compare the data collected from the administration of the FLE items of the questionnaire before the experiment, the independent samples t-test was employed. The population variances of the two groups on FLE were equal (t= -.585, p>0.05). Hence, no statistically significance difference was found between the groups before the experiment. Data analysis of the post-application of the FLE items of the questionnaire is presented in table 4.

Table 4.

Independent samples t-test for the control and experimental groups on FLE

Groups	N	Mean	SD	t	df	p-value	Sign.	Effect size
Experimental	30	3.47	.566	4.595	58	.000	0.05	0.9 high
Control	30	2.49	1.003					

* $p < 0.05$

Table 4 displays the mean scores of the post-implementation of the questionnaire regarding the FLE section. The results revealed that there was a statistically meaningful difference between the experimental group's (M=3.47, *SD*=.566) and the control group’s (M=2.49, *SD*=1.003) mean scores on the post-implementation of the FLE section. The t-value was (4.595), which is significant at the (0.05) level of significance. This indicated a significant difference between the groups at FLE in the post-implementation. The effect size of Glass's *delta was* equaled to (0.9), which shows a large effect. Consequently, hypothesis two was proved and accepted.

Furthermore, students’ responses to "strongly agree" and "agree" in the questionnaire were sorted under "agreement," while their responses to "strongly disagree" and "disagree" indicated disagreement. About 5% of the respondents were neutral (neither agree nor disagree) regarding the items of the questionnaire; therefore, students’ responses were categorized under either agreement or disagreement. Table 5 compares the descriptive statistics of the students' responses to the FLE items on the post-administration of the questionnaire.

Table 5.

Descriptive statistics of the post-implementation of FLE items of the questionnaire

Items	**Control group**			**Experimental group**		
		Percentages			**Percentages**	
	Means	**Agreement**	**Disagreement**	**Means**	**Agreement**	**Disagreement**
1. I don't get bored in the English class.	2.13	26%	70%	3.23	53%	23.3%
2. I enjoy the English class.	2.04	20%	60%	3.27	60%	33.3%
3. I perform well in the English class.	2.07	26.7%	76%	3.77	70.3%	26.7%
4. I feel proud of my accomplishments in this term’s English class.	2.77	33.3%	66.7%	3.50	66.7%	30%
5. The English class is a positive environment.	2.77	20%	57%	3.57	63.3%	20%
6. It is cool to learn English as a foreign language.	2.40	40%	33%	3.60	56.7%	23.3%
7. English class is fun.	2.80	16.7%	56.7%	4.00	63.3%	26.7%

8. My peers in the English class are nice.	2.60	30%	63.4%	3.63	33.3%	42.4%
9. We enjoy a good atmosphere in the English class.	2.70	16.7%	56.7%	3.80	60%	26.7%
10. We laugh a lot in the English class.	2.30	20%	50%	3.33	66.7%	16.7%

As shown in table 5, about half of the respondents from the experimental group reported that they don't get bored in English classes, whereas 70% of the respondents from the control group disagreed with this item. Only 20% of the control group indicated that they enjoyed the English class "item 2," compared to 60% of the experimental group. While 26.7% of the control group believed that they did well in English classes, the majority (70%) of their counterparts from the experimental group stated that they did well. Regarding item 4, one-third of participants from the control group were proud of their accomplishments in the English class, in comparison to two-thirds of the experimental group. Additionally, 20% of the control group perceived the learning environment positively, compared to 63% of the experimental group. 40% of the control group and 56.7% of the experimental group agreed that it was cool to learn a foreign language. Two-thirds of the students in the experimental group thought that the English class was fun, in contrast to 16.7% of the control group who shared the same belief. About one-third of the respondents from the two groups agreed that their peers were friendly. Moreover, a small number of students (16.7%) from the control group asserted that they enjoyed the atmosphere in English classes, while 60% of their counterparts confirmed that they enjoyed a good atmosphere. Almost two-thirds of the experimental group students reported that they laughed a lot in English classes, compared to 20% in the control group.

Hypothesis three: There is a statistically significant difference between the experimental group and the control group's mean scores of speaking anxiety on the post-implementation of the questionnaire in favor of the experimental group.

To test the third hypothesis, the researcher analyzed data collected from the FLSA section of the questionnaire using the independent samples t-test. The results showed that the mean scores of the experimental group were (M=2.80, SD=1.472), while the mean of the control group was (M=2.07, SD=1.202) and (df=58, *t*= -.361, p.>0.05). Thus, the two groups were similar before the experiment.

The results of the independent samples t-test of the post-administration of the questionnaire regarding FLSA revealed that there was a statistically significant difference between the experimental group's (M=3.92, SD =1.332) and the control group's (M=2.29, SD=1.165) mean scores. Table 6 shows the results of the independent samples t-test of the post-administration of the questionnaire (df=58, t= -5.575, p.<0.05). Findings revealed that the control group students suffered from high levels of anxiety compared to the experimental group. The effect size was found to be high (Glass's delta =1.23). Thus, the third hypothesis was confirmed.

Table 6.

Independent samples t-test for the control and experimental groups on FLSA

Group	N	Mean	SD	t	df	Sig.*(2-tailed)	Effect size
Experimental	30	3.92	1.332	-5.575	58	.000	1.23 high
Control	30	2.29	1.165				

** p <0.05*

The descriptive statistics of implementing the FLSA items of the questionnaire after the experiment were calculated and presented in Table 7.

Table 7.

Descriptive statistics of the post-implementation of FLSA items of the questionnaire

Items	**Control group**			**Experimental group**		
	Means	**Percentages**		**Means**	**Percentages**	
		Agreement	**Disagreement**		**Agreement**	**Disagreement**
11. Even if I am well prepared to speak in English classes, I feel anxious about it.	2.53	70%	23.3%	3.67	20%	66.7%
12. I always think that other students speak English better than I do.	2.47	83.3%	20%	3.87	30%	76.7%
13. I can feel my heart ponding when I'm going to be called on to speak in English classes.	3.23	33.3%	76.7%	4.10	13.3%	53.3%
14. I don't worry about making mistakes when I speak in English. (Reverse-coded)	1.60	40%	60%	4.70	70%	30%

15. I feel confident when I speak in English classes. (Reverse-coded)	2.43	20%	77%	3.83	66%	16.7%
16. I get nervous and confused when I am speaking in English classes.	2.03	26.7%	70%	3.37	73%	13.3%
17. I start to panic when I have to speak in English without preparation.	1.80	93%	7%	4.00	23.6%	73%
18. It embarrasses me to volunteer to speak in my English classes.	2.23	26%	63%	3.88	16.7%	63.3%

Table 7 shows that while 20% of the experimental group disagreed that they feel anxious to speak in English even if they are prepared, 70% of the control group agreed that they feel anxious. Most students in the control group believed that their peers spoke better than they did. However, 30% of the experimental group disagreed with this statement. Moreover, one-third of the control group approved that their heart beats increased when they were about to speak in English. On the contrary, a few students (13.3%) in the experimental group disapproved this feeling. Additionally, 60% of the control group students reported feeling worried about speaking English. Conversely, 70% of the respondents from the experimental group expressed their agreement with this item. Only 20% of students in the control group reported that they were confident speaking English, whereas nearly two-thirds of students in the experimental group reported that they were confident. As for item (16), 26.7% of the control group indicated that they get nervous and confused speaking in English, compared to 73% of the experimental group respondents who rejected this idea. Almost all the students in the control group agreed that they felt panicked about speaking without preparation. Additionally, 73% of the experimental group disagreed with this statement. Finally, 26% of students in the control group felt embarrassed to volunteer to speak in English, whereas most students (63.3%) from the experimental group expressed their disagreement with this feeling.

Hypothesis four: There is no correlation between speaking anxiety and foreign language enjoyment.

The researcher used Pearson product-moment to identify the relationship between speaking anxiety and FLE. The correlation was calculated twice to explore the relationship before and after the experiment. As for the pre-test, there was a small negative correlation between FLSA and FLE in the control group (r= -0.233) and the experimental group (r= -0.209). In the post-implementation, the correlation coefficient between the two affective variables for the control group was found to be (r= -0.346); which demonstrated a small negative correlation. On the other hand, table 8 shows that the correlation coefficient between FLE and FLSA for the experimental group was (r=-.934, p=.002 < 0.01); which indicated a strong negative correlation between anxiety and enjoyment. Since the correlation is negative, it is postulated that the more anxious to speak the students are, the less they enjoy the EFL class. Hence, the fourth hypothesis was not accepted.

Table 8.

Correlation between enjoyment, anxiety, and speaking for the experimental group

		FLE	**FLSA**	**Speaking**
FLE	Pearson Correlation	1	-.934	.809
	Sig. (2-tailed)		.002	.000
	N	60	60	60
FLSA	Pearson Correlation	-.934	1	-.608
	Sig. (2-tailed)	.002		.005
	N	60	60	60
Speaking	Pearson Correlation	.809	-.608	1
	Sig. (2-tailed)	.000	.005	
	N	60	60	60

**Correlation is significant at the 0.01 level (2-tailed)

Hypothesis five: *There is no correlation between speaking skills* ***and*** *foreign language* ***enjoyment****.*

The researcher used Pearson product-moment to identify the relationship between speaking and FLE. No significant correlation was found between speaking and FLE before the experiment for the two groups. However, there was a high statistically positive correlation (r =.809; p = 0.00) between speaking and FLE for the experimental group in the post-administration results (see table 8). A small positive correlation was found between speaking and FLE for the control group (r =.210). Thus, the fifth hypothesis was rejected.

Hypothesis six: *There is no correlation between speaking anxiety and speaking skills.*

The Pearson product-moment showed no significant correlation between FLSA and speaking for the two groups in the pre-implementation of the FLSA. Table 8 shows that there was a negative correlation between speaking and anxiety for the experimental group (r = -.608, p < 0.01).

Furthermore, there was a small negative correlation between the two variables for the control group (r = -.360). Hence, the sixth hypothesis was rejected.

Considering the results shown in table 8, the strength of the relationship between FLE and FLSA was (r2=.872), indicating that a large portion of (87%) of enjoyment was accounted for the level of anxiety that participants felt in EFL classes. As for the relationship between FLE and speaking, r-squared (r2 =.809) revealed that enjoyment accounted for about 80% of the speaking performance of the participants. Moreover, it was found that FLSA and speaking shared 37% of the variance, which is a medium effect size.

Qualitative data analysis:

- ***Open-ended questions***

The analysis of narrative data from the open-ended questions led to the emergence of five themes in each topic (enjoyment and anxiety). Although students were asked to respond to the two questions in the pre-administration of the questionnaire, only nine responded to the questions. Therefore, these responses were also analyzed and coded along with the responses to the post-administration phase. The researcher and another coder read the responses carefully, then classified the responses under each topic. The themes are presented below with their frequencies of occurrence. Most answers were short, and some were in Arabic. Hence, responses were translated by a professional translator to facilitate the coding process.

Enjoyment episodes

- Factors related to the teacher (frequency: 10%)

Both groups reported some incidents that showed that the teacher was friendly and supportive. Some quotes include:

“My teacher is friendly and gives good words when I answer correctly.”
“When I stop speaking, the teacher helps me as she is nice. "

- Factors related to the class activities (frequency: 14%)

Two students from the control group stated things related to speaking activities:

"I like it when a teacher gives words to study and revise before we speak."
"Doing role-play is good to speak."

Twelve students from the experimental group mentioned some speaking activities they found useful, including:

“*The best thing that makes me happy is speaking, and I prepare at home before I speak. I do activities alone and with my class. "*
"Discuss a topic and agree with friends…. I know how to express myself.... "

- Factors related to peers (frequency: 8%)

Five students from the experimental group stated that their peers were helpful and funny. Some responses were:

"Friends help me speak when we do role-play and speak together."
“I like that my friend tells me some words when I forget to say them and helps me.”
"We do Duolingo and a friend helps me when I don’t know anything."

- Factors related to classroom atmosphere (frequency: 33%)

While three students from the control group referred to the positive classroom environment, most respondents from the experimental group expressed that the atmosphere of the English class was positive and stress-free, which encouraged them to enjoy their learning experience. Here are two responses:

“We always have fun at English class, and I am usually happy and wait for this class to enjoy it with the teacher and friends.”
“I think that I do well in my English lessons, and we do funny activities in Duolingo, and I can speak well and be proud of myself, and the teacher is proud of me.”

- Factors related to Duolingo (frequency: 35%)

Students in the experimental group wrote some comments related to using Duolingo in class and how it encouraged them to enjoy their lessons and improve their language. These comments include:

“I enjoy using Duolingo because it's fun and I win XPs. I am the first in my class.”
“I spent one hour every day on Duolingo and I learned many new words. I use words in speaking. "
“My parents let me use their mobile to use Duolingo. So, I can use the mobile to learn and have fun. "

Speaking Anxiety episodes

The data related to speaking anxiety were grouped into five themes. Some comments were irrelevant and were discarded. The themes that emerged were as follows:

- Fear of making mistakes (frequency: 25%)

Most of the students in the control group reported that they usually felt anxious when they were called on to speak in English. Some stated that lack of preparation might cause them to be afraid to speak as they make a lot of mistakes. One-third of the students in the experimental group expressed their anxiousness before using Duolingo compared to their fear after using the application. One of them wrote:

"I feel relaxed speaking because I do Duolingo lessons before class and I think I make fewer mistakes than in the past."

- Inadequate linguistic knowledge (frequency: 40%)

Some responses reflected the respondents' inappropriate linguistic knowledge and made students anxious to speak in EFL classes. This was manifested in some incidents related to problems in grammar, vocabulary, and pronunciation, as follows:

Problems with grammar

Students highlighted some difficulties in sentence structure, tenses, and word order. Some comments include:

"I make mistakes in tenses and in choosing words correctly."
"I feel that when I speak, I can't say sentences and words in the correct order. I misuse adjectives and prepositions. "
I am not sure about the sentences I form... I think I write well, but when I speak I make sentences short and not complete. "

Problems with vocabulary

One of the areas that respondents reported being challenging was coming up with related vocabulary. Two students mentioned this problem as being the main barrier to speak:

"Sometimes I don't know what to say and it's difficult to find the right word...This is my only issue when it comes to speaking."
"When I speak, I suddenly stop and get confused because I can't think of words to say. Once I know the word, I have no problem."

Problems with pronunciation

Although a few students stated that they had some difficulty pronouncing some words, they did not consider this problem a barrier to speak. Here are two comments that support this idea:

“I have difficulty saying some words, but I can go and speak, and the teacher doesn’t stop me... After I finish, I know the correct way to say these difficult words. "

“I can’t say difficult words, and I check Duolingo or the dictionary, and I can say them well.”

- Perception as language learners (frequency: 14%)

Seven students reported that they perceived themselves as weak language learners, and they failed to speak confidently in English. Two wrote:

"I think I am weak in English, and this makes me unable to speak well in English."

"I am nervous because when I use English I find myself not good and I try, but I stop." I want to be better and more confident.

- Use of English outside the classroom (frequency: 12%)

Some responses were related to anxiety from being unable to use the target language in real-life situations and communicate with native speakers or English-speaking audience. For example, a student stated:

“I don’t use English outside school and don’t practice with people, and when I try to speak in class with friends, I only speak for a short time, and friends can’t speak well. This makes me confused. "

- Other factors: (frequency: 9%)

Some utterances mentioned factors related to physical problems such as stuttering and struggling with the articulation of some English sounds. Three students also described their shyness about speaking in front of others, which made them avoid confronting others even if they knew the answer.

- ***Semi-structured interviews***

Twelve participants from the experimental group were interviewed to get in-depth understanding of their emotions and experiences of using Duolingo in developing speaking skills, increasing enjoyment, and reducing anxiety in EFL classes. Responses were grouped according to the themes of the interview questions as follows:

- Duolingo and speaking:

All the interviewees reported that Duolingo improved their speaking because it was user-friendly and easy to use. Students said:

“I like using Duolingo because it is easy, and I find it interesting and motivates me to speak English, especially in class.”

"Yes..I listen to sentences and speak and make sure that I make no mistakes, so I am confident when I speak."
"Using Duolingo before class helped me to prepare and go to class and use what I learned to make no mistakes when I speak."
A student expressed that Duolingo was helpful in learning vocabulary, saying, "*I prefer to use Duolingo to learn words more than using the book.*"

Five of the interviewees also found Duolingo useful in improving their pronunciation. One commented, "*I learned to read words correctly after using Duolingo. I listen to the words more than once and I speak to the application to make sure I say right*".

- Duolingo and enjoyment:

Interviewees mentioned some factors in using Duolingo that enabled them to enjoy English classes. These factors were represented in the following words:

"Duolingo is interesting and makes classes not boring, and I come to the screen to answer questions and speak using new words."
"I don't like studying words from books. Duolingo is like a game, and I enjoy learning and studying and getting points and XPs.
"I find that we do Duolingo in class and at home... Duolingo sends messages to remind me to study. I enjoy that. "
"I enjoy doing activities like homework in Duolingo... I like this more than doing homework in a notebook and studying from the book. "

- Duolingo and speaking anxiety:

When asked about how Duolingo contributed to reducing speaking anxiety, interviewees reported that the game-based features in Duolingo enabled them to learn while playing, and they felt less stressed and more confident. Three responses demonstrated this feeling:
"The sounds and pictures when I give wrong or right answers are amazing... I don't feel I am learning, and I don't feel afraid when we use Duolingo in class. "
"I like being in competitions and this makes me learn more and feel not nervous about sharing what I learned in activities."
"I can check Duolingo and not ask the teacher all the time. This is good for me. I can learn alone and enjoy it with no fear. "

- Challenges in using Duolingo:

Some interviewees commented on the challenges they faced in using Duolingo. An interviewee mentioned having difficulty in using the microphone to pronounce words. She said, "*Sometimes "I click on the mic to speak, but it gives me that I pronounced it wrong. I tried many times, but I am sure I am correct.* "

"*I can't use the application offline, and sometimes I don't have internet and don't use Duolingo*.", said another interviewee.

Another comment showed the difficulty of using Duolingo at home due to limited time or parents' refusal to use the mobile. A student said, "*I wish I had time to do activities in Duolingo... This is something I can only do on weekends. My mum won't let me use my mobile, and I have to download Duolingo to her phone."*

- Using Duolingo in the future:

All the interviewees expressed their willingness and intention to use Duolingo to continue learning English. One said, *"I will use Duolingo to learn English. I will also learn Spanish because as it is interesting*". Another student said, *"Duolingo is fun, and I will always use Duolingo to learn English."*

Discussion

The current study investigated four research questions related to the effect of a game-based application, Duolingo, on EFL preparatory school students' speaking skills and two affective variables (FLSA and FLE). The findings of the current study contribute to the field of positive and negative emotions in EFL contexts. Exploring foreign language enjoyment is a novel area of EFL research, particularly in Egypt, where most school-age students suffer from anxiety and lack motivation to learn the foreign language. By identifying learners' emotions, EFL teachers will improve their practices that promote students' enjoyment and reduce their anxiety. Additionally, using Duolingo to enhance EFL speaking skills is one of the contributions of this study, as previous studies examined Duolingo mainly focused on receptive skills (Jiang et al., 2021; Jiang 2020).

The first research question scrutinized the effect of Duolingo on the experimental group students' speaking performance. The results of the independent samples t-test for the post-administration of the speaking test indicated that students who used Duolingo outperformed their counterparts who did not use Duolingo. These findings are corroborated by Niah and Pahmi (2019), whose findings showed that the students' speaking and listening improved after using Duolingo. Likewise, Loewen et al. (2019) found that using Duolingo enhanced students' language achievement. Moreover, students who used Duolingo in the present study developed speaking subskills including content, fluency, vocabulary, grammar, and pronunciation. This can be attributed to the transfer of knowledge of vocabulary and grammar gained from Duolingo's activities and lessons to improve productive skills. This is confirmed by Jiang et al. (2021), who claimed that Duolingo's lessons develop not only discrete linguistic knowledge (e.g., vocabulary and grammar), but also listening, reading, and speaking skills by transferring this knowledge to other skills.

Qualitative data analysis revealed that participants favored utilizing Duolingo to improve their speaking by doing funny activities at home, practicing the target language in a motivating environment, preparing before coming to class, and boosting their self-confidence as language learners. The researcher attributed the improvement in speaking skills to the time that students spent using Duolingo out-of-class and in-class, which accordingly reinforced the skills that students practiced in Duolingo. This is in line with Loewen et al.'s (2015) findings, which revealed that the effectiveness of Duolingo was associated with the amount of time spent inside class and outside class as homework. One possible explanation could be that Duolingo scaffolded students' language learning. Nah, Telaprolu, Rallapalli, and Venkata (2013) specified five aspects of mobile applications like Duolingo to be gamified: to be goal-oriented, successful, supportive of positive behaviors, competitive, and fun. Duolingo's coach helps students with goal setting, and the language trees feature gives the structure of the course and supports students in organizing their language skills. Receiving reminders helps students manage their time. The course counter shows the remaining time to finish the course. The daily counter feature keeps track of the daily streak. Moreover, translation is offered for learners once they tap on any word and grammar explanation is also given to promote students' language accuracy. With Duolingo Lingots, students can buy outfits or take tests to enrich their learning, which makes learning fun. The fluency percentage allows students to compare their current level to the proficiency level proposed by Duolingo. The leaderboard keeps track of the points the students obtain each week and ranks them based on their XPs. Through the review lesson button, students can review words they have learned. Additionally, the discussion forum encourages students to post questions and reflect on their learning (Botero et al., 2019).

In contrast, Rachels and Rockinson-Szapkiw (2018) found no meaningful difference in students' language proficiency between control and experimental groups, as the time spent on using Duolingo in classes wasn't sufficient for students to improve their grammar and vocabulary. Botero et al. (2018) also reported that a lack of out-of-class time was the main reason that some students didn't manage to improve their language skills. While participants in this study worked more on weekends and spent an average of eight hours using Duolingo in 18.6 days, participants in Botero's used Duolingo during weekends more than during weekdays and spent an average of nine hours using Duolingo in 15.13 days.

The second research question inquired about the influence of using Duolingo on students' enjoyment. The results of the present study showed that experimental group students showed a significantly higher level of enjoyment compared to control group students. This finding confirmed previous studies that concluded that students developed a sense of enjoyment in English classes after using Duolingo. Dewaele, MacIntyre, Boudreau, and Dewaele (2016) reported higher levels of enjoyment in which participants felt proud in the FL class. It was also found that learning through games promoted students' confidence, supported social bonds, and made the learning environment more exciting.

Analysis of qualitative data revealed that students in the experimental group enjoyed their English classes. They narrated episodes related to the teacher's personality and encouragement. This agreed with findings by Dewaele and MacIntyre (2014) and Arnold (2011) in that the role and personality of the teacher highly affected the classroom environment and students' enjoyment. The researchers found that teachers' approaches to hand students' mistakes, their approach to praise students' work, and their sense of humor were effective in helping students enjoy their EFL classes. Participants reported that they felt less anxious in classes where teachers laughed when things didn't go as expected. In response to the interview question that inquired about the impact of Duolingo on promoting enjoyment in EFL classes, interviewees generally reported that Duolingo successfully created a fun and safe environment that made them feel excited when they practiced the language. This finding draws upon the findings of Lotez (2019), who concluded that participants reported being more motivated after using Duolingo in class and outside of class. Findings from this study also showed that supportive and funny peers contributed to the increase in enjoyment in English class. Similarly, Dewaele and MacIntyre (2014) claimed that supportive peers make the learning atmosphere positive, especially if students work in smaller groups to practice the language and build social bonds. The results of the current study also agreed with Dewaele and MacIntyre (2014)'s findings in that students' confidence in their language level and their sense of accomplishment contributed to the level of enjoyment in FL classes.

Furthermore, interviewees reported that they enjoyed doing assignments on Duolingo more than any other mode. They reported that Duolingo allowed them to practice their language skills. This finding is in line with Lenkaitis (2019), who concluded that Duolingo was effective in increasing students' motivation in learning English as a second language and that they preferred doing activities using Duolingo over other modes. Munday (2016) found that students perceived Duolingo as user-friendly and enjoyable. Participants reported their preference to use the app more than using the course book because it is more accessible and gamified. Similarly, Brown, Roediger, and McDaniel (2014) argued that having features such as short prompts, spaced repetition, and integrated language skills in these methods increased the effectiveness of MALL apps in developing language skills.

Additionally, participants in the interviews perceived Duolingo positively for its availability 24/7, which reinforces their understanding of the target language. This agreed with previous research (Botero et al., 2018; Crowther et al., 2017; Mahbub et al., 2020), who found that Duolingo enhanced students' enjoyment and engagement in EFL classrooms and strengthened teacher-student and student-student interactions. Previous studies (Loewen et al., 2019; Mahbub et al., 2020) found that Duolingo encouraged a competitive learning environment among students. They emphasized the importance of using Duolingo in a formal and informal way to learn languages.

The third question explored the impact of Duolingo on students' speaking anxiety. The findings showed that experimental group students reported lower levels of anxiety in comparison with control group students. Responses to the questionnaire showed that students expressed their nervousness about speaking without preparation. They also expressed their anxiousness about being evaluated by peers. These findings are consistent with Gani et al. (2015) and Leong and Ahmadi (2017), who concluded that participants showed low self-esteem in their fluency, vocabulary, pronunciation, and ideas. Participants felt anxious to speak spontaneously and were afraid of their peers' evaluation. In the same vein, Li et al. (2018) argued that the teacher and peers' appreciation and support, group harmony, and collaborative activities alleviated speaking anxiety.

Responses to the open-ended questions and interviews revealed that inadequate linguistic knowledge affected students' speaking anxiety negatively. This result is consistent with Mukminin et al. (2015), who found that lack of vocabulary and grammar, fear of negative comments, low self-esteem, fear of the teacher's evaluation, and cultural factors significantly affected students' speaking anxiety. Moreover, Rajitha and Alamelu (2020) revealed that anxiety was mainly caused by language problems (e.g., inappropriate knowledge of grammar and pronunciation), fear of speaking in front of others, fear of peers' criticism, lack of confidence in language abilities, and shyness. The researchers suggested that the teacher must encourage students to speak and guide them to boost their motivation and improve their language. They believed that connecting what students learn in the English class to real-life situations will help enhance their speaking. Accordingly, Teimouri et al. (2019) and Botes et al. (2020) found that speaking anxiety affected achievement negatively and recommended that teachers understand the influence of affective variables on students' EFL achievement to keep a positive, stress-free classroom atmosphere.

Findings also showed that students' inability to use English outside of classes was one of the factors that affected speaking anxiety. Likewise, Loewen et al. (2019) stated that participants who used Duolingo reported their inability to use the learned language in real-life situations. Furthermore, findings of the present study revealed that participants were nervous about being criticized by others when they spoke and that others spoke better than them; therefore, they decided to avoid taking part in class activities. Ibrahim and Elhassan (2015) recommended that teachers must provide constructive feedback, especially in correcting oral mistakes. EFL teachers have to create a supportive learning environment and assure students that making mistakes is natural and part of learning. Likewise, Mon (2019) found that speaking anxiety was reduced by creating an interesting classroom environment, boosting students' self-confidence, motivation, and creativity. It was also found that anxiety was caused by teachers' practices and students' personalities.

The fourth question examined the relationship between the research variables. The results showed a strong negative correlation between enjoyment and anxiety. This finding is congruent with that of Bashori et al. (2021), who found a strong negative correlation between FLSA and FLE in the experimental groups but not in the control group. Dewaele and MacIntyre (2014) concluded that although enjoyment and anxiety were correlated, the absence of one did not automatically imply the presence of the other. This also correlated with Fredrickson's (2001, 2013) concept of the integration of play in learning as it strengthens relationships and enhances positive emotions. This result also agreed with the findings of Jiang and Dewaele (2019), who found negative association between foreign language anxiety and FLE. Although the current study agreed with that of Dewaele and MacIntyre (2014) in finding a negative correlation between FLE and FLSA, the shared variance in the former was large (87%), while it was small (12%) in the latter.

The findings of the present study indicated a strong positive correlation between speaking skills and enjoyment. Likewise, Bashori et al. (2021) found a positive correlation between vocabulary learning and FLE. Though no cause-effect relationship between speaking skills and speaking anxiety was explored in this study, the findings showed that anxiety had a negative correlation with speaking performance. This replicated the finding of Bashori et al. (2021) that there was a negative relationship between FLSA and vocabulary.

Besides, the findings of the qualitative data indicated that students in the experimental group perceived their experience of using Duolingo positively and expressed their intention to use Duolingo even after the experiment. They reported that using Duolingo made them less stressed when speaking in EFL classes and made learning more fun. Similarly, participants in Bashori et al.'s (2021) study indicated that they preferred to use online websites and applications that encourage them to speak and help them to reduce nervousness and boost their confidence by making fewer mistakes before they practice speaking in EFL classes. This finding was also supported by Ross et al. (2019), who claimed that using speech-enabled websites or applications encouraged students to overcome their fear of making mistakes and gain confidence in their choice of vocabulary and pronunciation.

However, interviewees in this study reported some challenges in using Duolingo, such as limited time at home, lack of internet connectivity, technical problems in recording voice, and parents’ refusal to use mobile-based applications. Likewise, Marques-Schafer and da Silva Orlando (2018) indicated that students found Duolingo’s activities repetitive and time-consuming; therefore, they stopped using the application after a while. Moreover, Mahbub et al. (2020) indicated some challenges in using Duolingo, including a lack of internet access.

Conclusion

The present study provided answers to four research questions investigating the effects of using Duolingo on EFL preparatory school students’ speaking and emotions. Students in the control group practiced school book speaking activities, whereas students in the experimental group used Duolingo in in-class and out-of-class time to complement the speaking activities in the school book. First, findings have shown significant improvement in the overall speaking skills and five subskills of the experimental group students in comparison to students in the control group. Second, the results of analyzing responses to the questionnaire indicated a higher level of enjoyment in speaking activities for the experimental group in comparison to the control group. Third, results of the data collected from the questionnaire have shown a significant decrease in experimental group participants’ speaking anxiety after the experiment. Fourth, the study contributed to previous studies measuring the correlations between the three variables. Findings showed a negative correlation between anxiety and enjoyment, a positive relationship between speaking performance and enjoyment, and a strong negative correlation between speaking anxiety and speaking. Furthermore, the qualitative data analysis revealed that the experimental group perceived Duolingo to be beneficial in terms of reducing speaking anxiety, promoting foreign learning enjoyment, and developing their speaking skills. Finally, it was concluded that using Duolingo in an EFL classroom was effective in improving EFL preparatory students' cognitive and affective skills.

Recommendations

EFL teachers must motivate students to speak and correct their mistakes in a supportive, low-stress environment. Teachers should also give more opportunities for students to speak English and use the target language communicatively. It is critical to identify the causes of students' anxiety and use instructional techniques and MALL applications that alleviate negative emotions. Teachers must be aware of the causes and symptoms of language anxiety, so that they can avoid negative practices and replace them with ones that encourage students to use the target language. Differentiating between an anxious learner and a weak one will help teachers support anxious students by creating a safe environment. Teachers must not compare students to their peers or make fun of them if they make mistakes. If teachers recognize that speaking in the target language provokes students' anxiety, they can provide students with engaging activities to encourage them to speak. It is also important to create an uncompetitive, supportive learning atmosphere by integrating technology to encourage students to speak up and overcome their fears. Additionally, providing students with the necessary language and grammatical structures that they need in speaking tasks is critical in alleviating speaking anxiety.

Future research can explore the effects of variables such as gender, age, or language learned on students' anxiety and enjoyment. Another avenue of research may tackle Duolingo or other MALL applications to identify the features that impact students' enjoyment. Conducting studies with a longer duration of time on a larger number of students from various stages will be noteworthy for providing valuable data to the EFL literature. The impact of Duolingo on other language skills and subskills must also be investigated. Comparing the usage of Duolingo on students' achievement in formal or informal learning in EFL contexts is vital.

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