# EME6208: IMA 2
# Usability Testing Report


## Duolingo

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# Introduction

Duolingo is a ***free*** mobile application (app) that can be downloaded for installation from the iTunes App Store (iOS platforms; Phone, iPad, Mac), the Google Play Store (Android platforms; SmartPhones); the Microsoft Store (Windows 10 Platform; PC, Mobile, HoloLens, Hub), or accessed directly from the Internet website (https://www.duolingo.com/). Duolingo is touted as: (a) "The best way to learning a language" (Duolingo, 2018, para. 1); (b) "Apple's iPhone App of the Year" (App Store Preview, 2018, para. 1); and (c), "Google Play's Editor's Choice and "Best of the Best" of 2013 and 2014" along with rave reviews from The Wall Street Journal, Time Magazine, and PC Magazine (Google Play Store, 2018, para. 4). Based on these accolades, the Duolingo app appears to be a valid and reliable instructional technology tool for language learning.

## Purpose

Duolingo serves as an anytime, anyplace delivery platform for users to learn/practice (e.g., speak, read, listen, and write) a language that is different from their own (i.e., foreign language) or to practice/enhance their own native language. With choices from among 23 language lessons, including "Spanish, English, French, German, Italian, Portuguese, Japanese, Korean and Chinese" (Duolingo Android Preview, 2005, para. 1). As such, Duolingo can be used for *formal* and/or *informal* learning purposes. For instance, schools and colleges can use Duolingo for formal educational learning purposes; whereas, users can use Duolingo for informal purposes, such as for entertainment, fun, personal gratification, and/or self-actualization purposes.

## Learning Theories Applied

Duolingo applies the three main learning theories: (a) behaviorism; (b) cognitivism; and (c), constructivism. Behaviorism is applied during drill-and-practice learning activities. Cognitivism is applied as the learning lessons are *chunked* into small, manageable segments in an attempt to avert cognitive overload (Sweller, 2006; 1988). And, constructivism is applied using game-based learning theory and gamification learning theory. For instance, gamification is "poured into every lesson" (Duolingo, 2018, para. 3) by employing gaming elements, such as rewards (e.g., earning points for completing lessons) and leader boards to incentivize learning situated in a fun-filled instructional environment. Game-based learning is also applied, given that game elements are used during the training/instructional process "to teach…or achieve a specific learning outcome" (Findlay, 2016, para. 1.).

### Usability Test

A usability test was conducted by five Group D: Delta team members (i.e., Michele Forbes, Amanda Glover, Rachel Martin, Kim Pond, and Sharon Taylor) all of whom assessed the usability of the application (app) to determine the extent to which the Duolingo interface supported the user's ability to achieve the intended/desired outcomes. To elicit validity (consistency) among the group members testing process, all group members used the same testing materials: (a) usability testing steps; (b) participant demographic questionnaire; (c) the usability testing script; (c) participant observation sheets based on pre-determined tasks plus two additional tasks; and (d), the end-of-session questionnaire and satisfaction survey. Quantitative data and qualitative feedback were gathered and analyzed to identify measurements results and common themes/trends, respectively. Amalgamated results revealed the following outcomes from participants who used the Duolingo online site and mobile application (app):

Duolingo Advantages: All participants were able to create a new account relatively quickly (in under four minutes), most users were able to choose from a variety of languages and complete the lesson tasks in under five minutes, and were at least moderately interested in learning another language. According to the satisfaction surveys provided, most participants reported the app to be informative, organized, and supportive for example when hearing the words correctly pronounced aloud.

Duolingo Disadvantages: A large majority of participants had difficulty, and spent a great amount of time (about two to three minutes) locating and navigating the settings options within the app. A large amount of time and the most errors occurred while attempting to share progress results possibly due to a lack of troubleshooting support and/or instructions for administrators prior to account set-up. Most participants were unsatisfied with the app's user interface. See the Recommendation settings for further details.

# Methodology

### Sessions

For the purposes of this convenience study, participants (N=10) were recruited to test Duolingo, a language learning service found on the Internet. This study was conducted in a casual setting where the participant felt comfortable and familiar, thus emulating normal usage of such a service. Participants were asked to

access Duolingo via one of the following applications: mobile (n=9) or desktop (n=1).

Prior to the beginning of any testing sessions, four documents were created to provide guidance and facilitate consistency across researchers. These are presented below in order of use during the testing process:

1. A Demographic/Background Questionnaire composed of sixteen questions (including one sub-question) was created for completion by each participant prior to their testing session. This questionnaire was used to collect individual information regarding gender, age, ethnicity, education, socioeconomic status, language skills and interest, and technical familiarity with using applications.
2. An Observation Sheet outlining six tasks for participants to complete, as well as a follow-up question pertaining to overall thoughts and experience. This sheet assisted in guiding each session through the desired tasks and allowed researchers to record testing times, task duration, and relevant field notes.
3. An End-of-Session Questionnaire to help assess participant experience in regard to each individual task. Each item on this questionnaire pertains directly to a task completed during the testing session and asks the participant to rank the ease of that task by using a Likert-type scale of 1 (super easy) to 5 (super hard). As its title implies, this tool was administered at the end of every session and was completed by the participant.
4. A Satisfaction Survey, made up of nineteen questions, was implemented after each session. This survey utilized a 7-point Likert-style scale (1=Strongly disagree, 4=Do not agree or disagree, 7=Strongly agree) and was used to gather participant reactions to the application tested and the tasks completed.

At the beginning of each session, the intent of the usability testing was explained, and participants were assured that the application was being evaluated, not them. During the sessions, each task was individually timed, total clicks were recorded, and total time was calculated. While tasks ranged in individual duration, from zero seconds to approximately sixteen minutes, most took between three and five minutes to complete. Task clicks ranged from 0-121, but mostly fell between 31 and 53 clicks. The total time for each session spanned approximately fourteen minutes in length: from nine minutes and thirty-eight seconds to twenty-four minutes, while the majority of the sessions lasted around eleven minutes.

See Attachment C for the subjective and overall questionnaires.

## Participants

Ten participants were recruited, on the basis of convenience, to attempt the completion of six predetermined tasks during their observed interaction with the

Duolingo application. Personal, professional, and educational demographics were collected to help the researchers better understand the testing participants. Personally, the majority of participants were female (n=7), White, non-Hispanic (n=7), born in the United States (n=9), never married (n=5), or between the ages of 30-39 (n=4). Also, all participants reported that their primary language was English (n=10), while only three stated they were able to speak another language (Spanish=2, French=1) and two specified they could write in a different language (Spanish=2). Of all of the participants, two indicated they were extremely interested in learning a new language, three were very interested, two were moderately interested, one was slightly interested, and two were not at all interested. Professionally, most participants work full-time (n=7), while two are retired and one is unemployed. The majority of participants reported an annual household income of $40,000-49,000 (n=4). Educationally, participants have completed a vast array of levels, including high school diploma or equivalent (n=1), some college with no degree (n=3), Associate degree (n=2), Bachelor's degree (n=1), and Master's degree (n=3). All demographic information collected is presented in the following table.

## Table (insert #). Participant Demographics

| Characteristics | Results |
|---|---|
| **Gender** | Male…….....3<br>Female…….....7 |
| **Age** | 20-29…….....2<br>30-39…….....4<br>40-49…….....2<br>50-59…….....0<br>60-69…….....2 |
| **Marital Status** | Married…….....3<br>Never Married…….....5<br>Separated…….....0<br>Divorced…….....1<br>Widowed…….....1 |
| **Ethnicity** | White, non-Hispanic…….....7 |

| | |
|---|---|
| | White, Hispanic……..…2<br>Black, Hispanic…….....1 |
| **Country of Birth** | United States…….....9<br>Canada…….....1 |
| **Primary Language** | English……..…10 |
| **Highest Education** | Less than High School diploma…….....0<br>High School diploma or equivalent…….....1<br>Some College, no degree……...3<br>Associate degree…….....2<br>Bachelor's degree…….....1<br>Master's degree…….....3<br>Doctoral degree……..…..0 |
| **Spoken Language (other than primary)** | French…….....1<br>Spanish…….....2<br>None…….....7 |
| **Written Language (other than primary)** | Spanish…….....2<br>None…….....8 |
| **Employment Status** | Full-Time…….....7<br>Part-Time…….....0<br>Retired…….....2<br>Student…….....0<br>Unemployed……..…..1 |
| **Household Income** | Less than $20,000…….....0<br>$20,000-29,999…….....1<br>$30,000-39,999…….....0<br>$40,000-49,999……..…..4 |

| | |
|---|---|
| | $50,000-59,999……..…….....0<br>$60,000-69,999……..…….....0<br>$70,000-79,999……..…….....1<br>$80,000-89,999……..…….....1<br>More than $90,000……..……1<br>Not Disclosed……..……..……2 |
| **Served in Military** | Yes……..…….....2<br>No……..…….....8 |
| **Stationed Outside the U.S.** | Yes……..…….....1<br>No……..…….....…6<br>N/A……..…….....…3 |
| **Application Usage** | Never……..…….....0<br>Infrequent……..…….....0<br>Moderately……..…….....…1<br>Frequently……..…….....….4<br>Always……..…….....5 |
| **Interest in Learning New Language** | Not at All……..…….....2<br>Slightly……..…….....1<br>Moderately……..…….....……2<br>Very……..…….....3<br>Extremely……..…….....…..2 |

It is expected that participants will have some familiarity with using technology, such as a smartphone, tablet, or desktop, and have some understanding of how to navigate a basic application. In response to a question asking how often they used mobile or desktop applications, all participants indicated that they do so at least moderately (n=1), while the majority reported using them frequently (n=4) or always (n=5). Researcher expectation is also that the participants will not have any or much familiarity with the application being tested, as this would skew the results of the usability test. It is, though, expected that participants will possess a basic level of technical knowledge, allowing them to understand the tasks they

are asked to complete. While participants may ask questions pertaining to the application during the testing session, they were made aware prior to their session that, in an effort not to influence testing result, researchers would only provide answers after the completion of that session. Similarly, no training was provided on the application being tested.

### Evaluation Tasks/Scenarios

Participants were asked to complete a total of six tasks during the usability testing. Four tasks were predetermined plus two additional tasks were attempted by participants, as listed below. Task 7 was not included within the Usability Task testing instructions.

***Predetermined Tasks*:**

- Task 1. Complete the steps necessary to create a new account. Stop after your account has been created.
- Task 2. Now, find one language you would like to learn and add it to your profile/account.
- Task 3. Change the language to other language you would like to learn.
- Task 5. Turn off and turn on auditory sound.
- Task 7. Go to the setting/preference and change one setting option (null).

***Additional tasks:***

- Task 4. Complete the first lesson of your chosen language.
- Task 6. Go to the setting/preference and share your progress with GroupD_username@mail.usf.edu

# Results

### Task Completion Success Rate

Five Group D: Delta team members (i.e., Michele Forbes, Amanda Glover, Rachel Martin, Kim Pond, and Sharon Taylor) conducted the usability test (n = 10) without prompting. All participants (100%) successfully completed Task 1 (create a new account). Ten of ten (100%) successfully completed Task 4 (additional task; complete the first lesson of your chosen language). Nine of the ten (90%) successfully completed Task 2 (find a language to learn and add it to profile). Nine of the ten (90%) successfully completed Task 3 (change to another language). Eight of ten (80%) successfully completed Task 5 (turn sound off/on). Three of ten (30%) successfully completed Task 6 (go to settings/share

progress). None of ten (0%) successfully completed Task 7 (go to settings, change one option), which is attributable to the question not being asked of participants, because it was not listed among the tasks to do on the observation sheet. See Task Completion Success Rates table, below.

**Task Completion Success Rates**

| Participant | Task 1 | Task 2 | Task 3 | Task 4 | Task 5 | Task 6 | Task 7 |
|---|---|---|---|---|---|---|---|
| 1 | √ | ---- | √ | √ | √ | ---- | ---- |
| 2 | √ | √ | √ | √ | √ | ---- | ---- |
| 3 | √ | √ | ---- | √ | ---- | √ | ---- |
| 4 | √ | √ | √ | √ | √ | √ | ---- |
| 5 | √ | √ | √ | √ | √ | ---- | ---- |
| 6 | √ | √ | √ | √ | √ | ---- | ---- |
| 7 | √ | √ | √ | √ | √ | ---- | ---- |
| 8 | √ | √ | √ | √ | √ | ---- | ---- |
| 9 | √ | √ | √ | √ | ---- | ---- | ---- |
| 10 | √ | √ | √ | √ | √ | √ | ---- |
| **Success #** | **10** | **9** | **9** | **10** | **8** | **3** | **0** |
| **Completion Rates %** | **100%** | **90%** | **90%** | **100%** | **80%** | **30%** | **0%** |

*√represents a completed task, ---- represents an incomplete task *Note: Task 7 was null/not completed.*

**Learnability: Time to complete a task successfully**

Each team member recorded the time on task for each participant. Some tasks were inherently more difficult to complete than others and is reflected by the average time on task. For example, Task 4 had the longest completion time with the shortest time attempted being 159 seconds and the longest time on the task 503 seconds. The shortest completion time was task 2 with an average of 8.9 seconds. This is an accurate average although participant 6 and 9 had completion times in the double digits.

**Test subjects were given 6 specific tasks to complete:**

Task 1: Complete the steps necessary to create a new account. Stop after your account has been created.

Average completion time - **223.5 seconds** *(3.73 minutes)*

Task 2: Now, find one language you like to learn and add it to your profile/account.
Average completion time - **8.9 seconds**
Task 3: Change the language to other language you would like to learn.
Average completion time - **53.7 seconds**
Task 4: Complete the first lesson.
Average completion time - **288.8 seconds** *(4.8 minutes)*
Task 5: Turn off and turn on the sound effects.
Average completion time - **92.9 seconds** *(1.54 minutes)*
Task 6: Share your progress with the USF email provided.
Average completion time -**168.8 seconds** *(2.81 minutes)*

**Time on Task (in seconds)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 | P8 | P9 | P10 | Avg. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Task 1** | 52 | 62 | 123 | 960 | 228 | 218 | 239 | 204 | 88 | 61 | **223.5 sec.** |
| **Task 2** | 2 | 5 | 4 | 3 | 2 | 26 | 8 | 4 | 28 | 7 | **8.9 sec.** |
| **Task 3** | 200 | 122 | 2 | 2 | 61 | 10 | 31 | 19 | 33 | 57 | **53.7 sec.** |
| **Task 4** | 503 | 250 | 360 | 0 | 159 | 176 | 287 | 306 | 503 | 344 | **288.8 sec.** |
| **Task 5** | 70 | 5 | 60 | 120 | 142 | 29 | 108 | 191 | 112 | 82 | **92.9 sec.** |
| **Task 6** | 219 | 134 | 240 | 360 | 37 | 64 | 183 | 157 | 219 | 75 | **168.8 sec.** |
| **Task 7** | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | **---** |
| **Avg.** | **174.83 sec.** | **96.3 sec.** | **131.5 sec.** | **240.83 sec.** | **104.8 sec.** | **87.1 sec.** | **142.67 sec.** | **146.83 sec.** | **163.8 sec.** | **104.3 sec.** | |

## Errors

Each team member captured the number of errors participants made while trying to complete the task scenarios.

**Note:** *Task 6 could only be successfully completed if testing administrators were able to troubleshoot and obtain a class code **prior** to engaging in the usability test with participants. Participants could not share their progress report without a class code provided and, as such, task 6 created a critical error due to the inability of most participants (7/10) to complete the task of sharing their progress.*

Task 6 (share progress with test administrators via e-mail) outweighed all others in terms of errors made by participants with P1, P2, and P5-P9 being unable to complete the task resulting in a critical error rate of 70%. Tasks 2 (add a language to user profile) and 3 (pick a new language to learn) produced a critical

error rate of 10% with two participants, one per task, being unable to complete each respective task. Task 5 (turn sound on and off) had the second highest rate of critical errors at 20% with two participants unable to complete the task. Tasks 1 (create a new account) and 4 (complete the first lesson) were completed by all participants without producing any non-critical errors.

Task 4 is notable for its lack of non-critical errors because participants were engaged in a lesson and not attempting to navigate through the user interface. Task 1, despite all participants completing it after recovery, produced non-critical errors that had the second-highest rate of time on task due to the noted initial difficulties in navigating to and accessing the settings page to begin the process of signing up for an account.

**Errors (per participant and task)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 | P8 | P9 | P10 | Avg. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Task 1** | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | 0% |
| **Task 2** | ---- | √ | √ | √ | √ | √ | √ | √ | √ | √ | 10% |
| **Task 3** | √ | √ | ---- | √ | √ | √ | √ | √ | √ | √ | 10% |
| **Task 4** | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | 0% |
| **Task 5** | √ | √ | ---- | √ | √ | √ | √ | √ | ---- | √ | 20% |
| **Task 6** | ----- | ---- | √ | √ | ---- | ---- | ---- | ---- | ---- | √ | 70% |
| **Task 7** | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| **Avg.** | 33% | 17% | 33% | 0% | 17% | 17% | 17% | 17% | 33% | 17% | |

*√indicates a task where an error did not occur, ---- indicates a task where an error occurred. *Note: Task 7 was null/not completed.*

## Summary of Data

The table below displays a summary of the test data. Low completion rates and satisfaction ratings and high errors and time on tasks are highlighted in red.

**Summary of Completion, Learnability (Time on Task), Errors**

| Task | Task Completion | Learnability (Time on Task) | Errors |
|---|---|---|---|
| **1** | **100%** | **223.5 seconds** | **0%** |
| **2** | **90%** | **8.9 seconds** | **10%** |
| **3** | **90%** | **53.7 seconds** | **10%** |
| **4** | **100%** | **288.8 seconds** | **0%** |
| **5** | **80%** | **92.9 seconds** | **20%** |
| **6** | **30%** | **168.8 seconds** | **70%** |
| **7** | **----** | **----** | **----** |

## Satisfaction

From among the six tasks performed, the majority (90%) of test subjects agreed that Task 2 (i.e., find one language that (s)he would like to learn and add it to his/her profile/account) was the easiest, as reflected in The Task Questionnaire Table, below.

**Task Questionnaire Table**

| | Super easy* | Easy* | Not easy or hard | Hard | Super hard | Mean Rating | Percent Agree |
|---|---|---|---|---|---|---|---|
| **Task 1** | 1 | 6 | 1 | 2 | 0 | 2 | 70% |
| **Task 2** | 6 | 3 | 0 | 1 | 0 | 2 | 90% |
| **Task 3** | 1 | 4 | 3 | 1 | 1 | 2 | 50% |
| **Task 4** | 0 | 0 | 2 | 6 | 2 | 2 | 0% |
| **Task 5** | 0 | 0 | 3 | 5 | 2 | 2 | 0% |
| **Task 6** | 0 | 0 | 2 | 5 | 3 | 2 | 0% |
| **Task 7** | ---- | ---- | ---- | ---- | ---- | ---- | ---- |

*Percent Agree (%) = Agree & Strongly Agree Responses combined *Note: Task 7 was null/not completed.*

***Percent Agreed***

The variables that received the highest satisfaction ratings were Tasks 1, 2, and 3. The majority of participants (70%) agreed that it was easy (10%) or super easy (60%) to create a new Duolingo account (Task 1). The majority of participants (90%) agreed that it was easy (30%) or super easy (60%) to find one language that (s)he would like to learn and add it to his/her profile/account (Task 2). Half (50%) of the participants agreed that it was easy (10%) or super easy (40%) to change the language to other language (s)he would like to learn (Task 3).

***Percent Disagreed***

The variables that received the lowest satisfaction ratings were Tasks 4, 5, and 6. During Task 4, none (0%) of the participants found it easy to turn off the auditory sound (Task 4); the majority (100%) of participants found it was not easy or hard (20%), hard (60%), or super hard (20%) to turn off the auditory sound. During Task 5, none (0%) of the participants found it easy to go to a setting/preference and change a setting option; the majority of participants found it was not easy or hard (30%), hard (50%), or super hard (20%) to go to a setting/preference and change a setting option. During Task 6, none (0%) of the participants found it easy to share their progress with the group member by email; the majority of participants found it was not easy or hard (20%), hard

(50%), or super hard (30%) to share their progress with the group member by email.

### Satisfaction Questionnaire Table

The Satisfaction Questionnaire Table, below, indicates the following.

***Satisfied***

The majority of participants were most satisfied with: (a) the information (help, messages) provided with the app (70%); (b) the ease in finding the information needed (70%); and (c), the organization and clarity of information (70%). Half of the participants (50%) of participants found: (a) the app information easy to understand; and (b), effective in helping to complete the task.

***Not Satisfied***

Four tasks received the lowest satisfaction ratings: (a) ease of use (20%); (b) ease of learning (20%); (c) productivity (20%); and (d), ability to recover (20%) categories, which means that the majority (80%) of participants were dissatisfied with the app in these categories. The second lowest satisfaction ratings revealed that participants found seven additional tasks to be difficult to complete, which included: (a) simplicity to use (30%); (b) effectiveness for task completion (30%); (c) comfort level using the app; (d) pleasant interface (buttons, menus, graphics); (e) likeability using the interface (buttons, menus, graphics); and (f), overall satisfaction, which means that the majority (70%) of participants were dissatisfied with the app in these categories. Less than half (40%) of the participants found the app to be: (a) ineffective for completing the tasks; (b) ineffective for providing error messages with information for how to fix problems; and (c), missing wanted functions and capabilities wanted/expected to have in the app.

| Satisfaction Questionnaire Table<br>Tasks | 1<br>Strongly Disagree | 2 | 3 | 4<br>Do not agree or disagree | 5 | 6 | 7<br>Strongly Agree | Mean | Percent Agree |
|---|---|---|---|---|---|---|---|---|---|
| 1. Overall, I am satisfied with how easy it is to use this language learning app. | 0 | 0 | 2 | 1 | 5 | 2 | 0 | 6.71 | 70% |
| 2. It was simple to use this language learning app. | 0 | 1 | 2 | 1 | 3 | 3 | 0 | 6.43 | 60% |
| 3. I could effectively complete the tasks using this language learning app. | 0 | 2 | 1 | 2 | 4 | 0 | 1 | 6.0 | 50% |
| 4. I was able to complete the tasks quickly using this language learning app. | 0 | 1 | 2 | 3 | 3 | 0 | 1 | 6.0 | 40% |
| 5. I was able to efficiently complete the tasks using this language learning app. | 0 | 2 | 2 | 0 | 4 | 1 | 1 | 6.14 | 60% |
| 6. I felt comfortable using this language learning app. | 0 | 3 | 0 | 1 | 4 | 1 | 1 | 6.14 | 60% |
| 7. It was easy to learn to use this language learning app. | 0 | 0 | 2 | 1 | 3 | 3 | 1 | 7.14 | 70% |
| 8. I believe I could become productive quickly using this language learning app. | 1 | 0 | 1 | 0 | 5 | 1 | 2 | 7.0 | 80% |
| 9. This language learning app gave error messages that clearly told me how to fix problems. | 2 | 2 | 0 | 4 | 0 | 0 | 2 | 5.14 | 20% |
| 10. Whenever I made a mistake using the language learning app, I could recover easily and quickly. | 1 | 0 | 1 | 0 | 5 | 1 | 2 | 7.0 | 80% |
| 11. The information (such as on-line help, on-screen messages and other documentation) provided with this language learning app was clear. | 5 | 0 | 2 | 1 | 1 | 0 | 1 | 3.86 | 20% |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 12. It was easy to find the information I needed. | 3 | 1 | 3 | 1 | 2 | 0 | 0 | 4.14 | 20% |
| 13. The information provided for this language learning app was easy to understand. | 2 | 2 | 1 | 0 | 4 | 1 | 0 | 5.0 | 50% |
| 14. The information was effective in helping me complete the tasks. | 2 | 3 | 0 | 0 | 5 | 0 | 0 | 4.71 | 50% |
| 15. The organization of information on the language learning app screens was clear. | 1 | 3 | 2 | 0 | 1 | 1 | 2 | 5.42 | 30% |
| 16. The interface of this language learning app (buttons, menus, graphics) was pleasant. | 1 | 2 | 0 | 0 | 5 | 1 | 1 | 6.14 | 70% |
| 17. I liked using the interface of this language learning app (buttons, menus, graphics). | 1 | 2 | 0 | 1 | 5 | 0 | 1 | 5.86 | 60% |
| 18. This language learning app has all the functions and capabilities I expect it to have. | 3 | 0 | 1 | 2 | 1 | 2 | 1 | 5.43 | 40% |
| 19. Overall, I am satisfied with this language learning app. | 2 | 0 | 1 | 1 | 3 | 2 | 1 | 6.14 | 60% |

**Percent Agree (%) = Agree to Strongly Agree Responses combined*

**User experience**

The user experience was varied by participant. It was an even split with participants who would use the Duolingo program and who would not use this program going forward.
Participants who enjoyed Duolingo specifically commented on how the app was set up similar to a game and a player had goals and could earn points through the learning process. With this being said, participants noted that this would be a great app for kids or to prepare a person for traveling.

Participants who did not enjoy Duolingo and would not continue to use this program noted that although the lesson itself was fun, the remaining tasks were difficult, and the program was not user friendly. The app was difficult to navigate and hard to find the settings.

# Recommendations

In response to both the survey responses and the open-ended commentary by the ten participants, we would make several recommendations to improve the usability of the Duolingo language learning application:
● Increase clarity of organization for the information provided on the application screens, such as the settings.
● Create a provision for online help and troubleshooting, and additional information to aid the user in the event of an error/mistake, such as sharing progress via class codes.
● Include detailed error messages as part of the lesson guiding learners to adjust their knowledge construction instead of simply moving on to the next task.
● Improve the correlation of pictorial characters/objects to the current task. For example, when referring to an “apple”, display a picture of an apple to activate the learners varying modalities.
● Improve the ease of access of setting from all pages within the application

| Change | Justification | Severity |
|---|---|---|
| Increase clarity of organization for the information provided on the application screens (app functions). | • 80% of participants had errors<br>• Average time to complete the tasks were between 94.9 seconds (1.54 minutes) and 168.8 seconds (2.81 minutes)<br>• Satisfaction ratings of 0% found this easy nor super easy. | High |
| Create a provision for online help and troubleshooting, and additional information to aid the user in the event of an error/mistake, such as sharing progress via class codes. | • 30% of participants could complete the task.<br>• Some test administers noted troubleshooting prior to administering the test to obtain a “class code” leading to success. | Medium |
| Include detailed error messages as part of the lesson guiding learners to adjust their knowledge construction instead of simply moving on to the next task in order to achieve the objective of teaching another language. | • 0% of participants experienced errors hindering them from completing a lesson.<br>• Lessons took on average of 288.8 seconds (4.8 minutes) to complete. | Low |

| | | |
|---|---|---|
| Improve the correlation of pictorial characters/objects to the current task. For example, when referring to an “apple”, display a picture of an apple to activate the learners varying modalities. | • 0% of participants experienced errors hindering them from completing a lesson.<br>• Lessons took on average of 288.8 seconds (4.8 minutes) to complete.<br>• Commentary was given during the Usability Testing that the pictures did not correlate with the lesson task, and it “felt like a guessing game” at times. | Medium |
| Improve the ease of access of setting from all pages within the application. | • 80% of participants had errors<br>• Average time to complete the tasks were between 94.9 seconds (1.54 minutes) and 168.8 seconds (2.81 minutes)<br>• Satisfaction ratings of 0% found this easy nor super easy.<br>• Commentary was given during the Usability Testing that the settings functions were not user friendly, and should be accessible from all screens/pages of the app. | High |

# Conclusion

In terms of utility, 80% of participants agreed that it does what it is supposed to as a language learning program and that Duolingo would help them become productive quickly in learning a new language. However, its sense of usability is negatively impacted by a lack of clarity in its app functions as well as in the difficulty of accessing the "Settings" menu. Recommendations for integrating feedback from users to improve usability can be accomplished with a quick interactive introductory tutorial that will help users navigate through app features and to include more points of access to the "Settings" menu within the program's flowchart.

The most promising aspect of Duolingo that many participants enjoyed was in its gamification of the language learning process which directly aligns with the gamification trend that many purveyors of educational tools and resources are adopting. If its sense of usability could be improved, there is no reason why Duolingo could not be a part of a user's daily app rotation.

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# Attachments

See CANVAS for uploaded documents:
Attachment A – Group D completed observation sheets
Attachment B – Group D completed task questionnaires
Attachment C – Group D completed satisfaction questionnaires
Attachment D – Group D completed demographic questionnaires