

Duolingo: Application of AI-Driven Technology to Teach English

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Background

Globalization & ELL

Many people whose native language is not English are becoming English language learners (ELL).

Learning with Technology

The newest approach to overcoming the difficulties of learning English involves integrating technology (Ajisoko, 2020).

AI in Language Learning

The use of artificial intelligence (AI) in language learning, such as chatbots, has been extensively investigated in recent studies (Kim et al., 2019)

Duolingo

- Duolingo is a **free** language-learning platform, which has become one of the most popular tools for language learning (Jašková, 2014).
- It includes a language-learning website and a mobile application, offering free lessons among 40 languages for more than **500 million learners** (Blanco, 2021)

Number of countries studying most popular languages in 2021

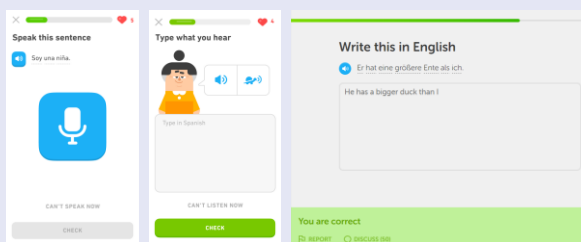
ENGLISH	SPANISH	FRENCH	GERMAN	JAPANESE
120	31	24	7	5
ITALIAN	KOREAN	IRISH	SWAHILI	SWEDISH
2	2	1	1	1

Most popular language studied on Duolingo in each country in 2021



(Blanco, 2021)

Platform Overview



History

- The design intention is based on the experience of **expensive English education** within the founder's community in Guatemala.
- Rooted in his belief that "free education will really change the world," Duolingo's platform launched publicly, free of charge.
- Duolingo was originally designed to be used in the context of the non-classroom learning environment with the scope of "beyond the walls of the classroom" (Brebera, 2017).
- In 2016, as Duolingo was identified as an effective tool in a classroom setting, Duolingo started a new feature called "**Duolingo for Schools**" to match the user's needs. It allows teachers to **create assignments and track students activity**.



Goal Setting

- Based on microlearning.
- Is goal-oriented.
- Range from 5 min/day to 20 min/day.
- Flexibility to personalized.
- Teachers may track students' performance if use "Schools"

Pick a Track

CASUAL 5 minutes a day

REGULAR 10 minutes a day

SERIOUS 15 minutes a day

INSANE 20 minutes a day

You can always change tracks later in Settings.

SET GOAL

Placement test

Offered at the beginning that enables users to **assess** their level of proficiency in the target language.

The test only takes few minutes to complete and will provide an approximate estimation of a user's skills.

Choose your path!

Beginners start at Basics 1. Advanced learners take a short test.

Basics 1

Placement test

Example Items: Vocabulary

Your learner may get vocabulary questions asking them to identify a picture in response to the question. They can hover over each picture to hear an English speaker pronouncing the word.

¿Cuál de estos es "hombre"?

boy man girl

SALTAR CALIFICAR

Example Items: Translation

The test includes translation items. Learners are asked to translate an English word or sentence into their native language.

Escribe esto en español

boy

word sentence audio

Recuerda que siempre puedes pronunciar las palabras para ver si que significan.

SALTAR UTILIZAR TUTORIAL CALIFICAR

Example Items: Listening

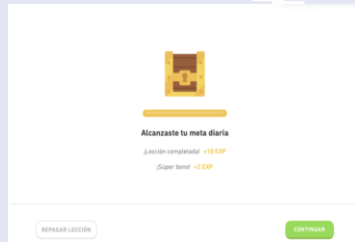
Learners will hear a sentence in English. They can choose to hear it again by clicking on the speaker button or hear it in slow-motion by clicking on the turtle.

Escucha y selecciona las palabras

woman man a girl boy am

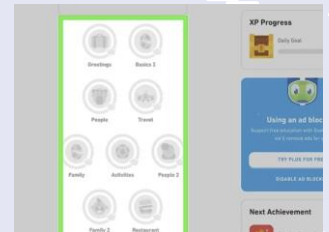
Example Items: After the Test

After completing the test, the learner should see a treasure chest. Beneath the treasure chest there is information about the number of experience points they have been awarded for taking the test.



Access the Skill Tree

- The skill tree is where you'll do most of your learning.
- It's split into different units, and each unit contains multiple lessons.
- As you progress through the language, more units will be available to you.



Four Types of Questions



Vocabulary: You'll see a picture of the item and be asked to name it in either your native or target language.



Translation: You'll be asked to translate a word or sentence out of English and into the other language, or vice versa.



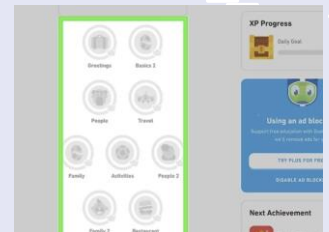
Listening: You'll hear an audio clip of a word or sentence and be asked to type it in. You'll see "Type what you hear" above it. (Note that you won't be translating for these questions — for instance, if you hear the sentence in Spanish, type it in Spanish, not English.) To play the clip more slowly, click the smaller turtle icon beneath the main speaker button.



Speaking (optional): You'll be asked to repeat or translate sentences using the microphone on your computer or mobile device.

Access the Skill Tree

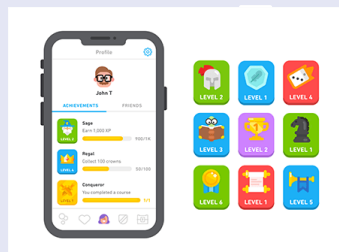
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Gamification

Duolingo applies gameful learning to keep the learner motivated and consistently engaged in a positive and casual learning environment.

Its learning process is structured as a learning game that has game features, such as reward, badges, and leader-board, to allow users to learn as playing.



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The AI Behind Duolingo

Jambo!



Why incorporate AI?

- The value of Duolingo is to make education **universally accessible**.
- One-on-one tutor is a not available to everyone.
- AI can reach to everyone:
 - Has sufficient knowledge about the learning materials.
 - Keeps learners engaged.
 - Gets inside of your head.

(Duolingo, 2021)

How does Duolingo incorporate AI?

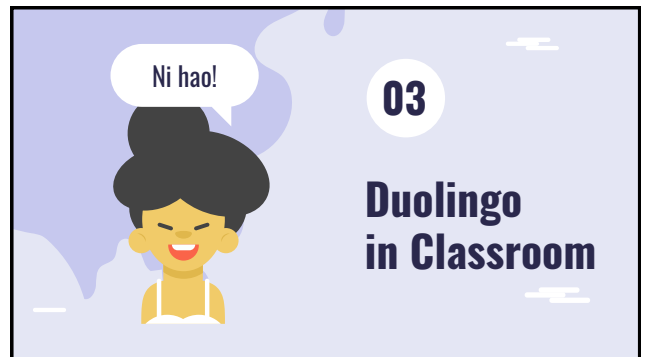
- Using machine learning and natural language processing to guide lesson design.
 - Analyze the vocabulary, grammar content, audio and podcast scripts for Duolingo Stories or Duolingo Podcast or audio lessons.
 - Align them with a target level of proficiency
- Making materials engaging.
 - Create custom voices for audio characters.
 - Personalized push notifications.

(Duolingo, 2021)

How does Duolingo incorporate AI?

- Innovate Birdbrain system to get inside of learner's head and personalize learning.
 - Base on the zone of proximal development
 - Make accurate predictions on the percentage to get right
 - Select the personalized exercise so that it's neither too hard or too easy
 - To keep learners challenged but still motivated

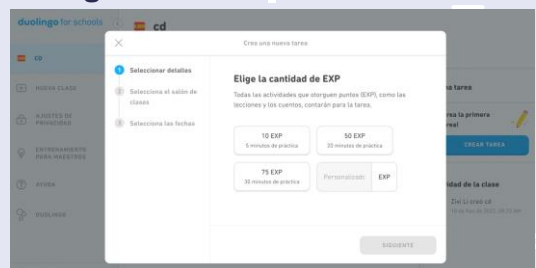
(Duolingo, 2021)



The Friends Feature



Duolingo for Schools



Duolingo for Schools

- Teacher dashboards enable easy monitoring
 - Visualize student's learning time, XP earned, and assignments
 - Adjust content to the right level
 - Manage the cultural inappropriate content (e.g. wine)
- Student dashboards are ad-free.
- Personalized learning
 - AI will adapt student learning
 - Students can make mistakes without penalty

04

Our Research

Hi!



Overview of the Study

This study investigated the types of **self-directed learning (SDL)** skills that learners apply when learning a language out of the classroom with systems like Duolingo. It also explored how the design and delivery of Duolingo can support and facilitate student SDL.

Background



Context of the Study

- Learning with technology (e.g. Duolingo) in an out-of-classroom context is often challenged by the **absence of instructors and lack of guidance**.
- Therefore, it demands a much higher level of **self-directed learning (SDL)** ability for the learners to be successful.
- White (1995) suggests that learners need to have strong **independence, autonomy, and control** to self-manage learning and make their own decisions in distance language learning.

Research Question

- How do Duolingo learners **self-manage** their learning?
- What **self-monitoring** strategies are employed by Duolingo learners to overcome challenges and frustrations related to learning foreign languages with Duolingo?
- What **motivating factors** underpin the decisions of learners to learn a foreign language with Duolingo?

Garrison's (1997) Framework of SDL

- **Self-management** is the task control ability that is associated with external activities, such as time, resources, and goal management.
- **Self-monitoring** is the cognitive and metacognitive process of establishing learning strategies and learning paces.
- **Motivation** can initiate and sustain learning efforts towards cognitive goals (Garrison, 1997).

Study Design

The 10 research participants represented a wide range of age and ethnic groups.

Participants of this study were screened and identified through the previous survey that was distributed through the Duolingo forum, an online language community using Discord, as well as through postings on Facebook pages, emails, and WeChat groups. The interviewees' demographics are listed in Table 1.

Table 1. Duolingo Interviewee Demographic and Language Learning Information

Interviewee	Gender	Country	Native Language	# of years using Duolingo	Languages learned through Duolingo
P1	M	Mexico	Spanish	More than 7 years	English, French
P2	M	United States	English	1 - 3 years	Japanese
P3	F	China	Chinese	Less than 6 months	Japanese
P4	F	Costa Rica	Spanish	6 months - 1 year	Portuguese
P5	F	China	Chinese	1 - 3 years	French
P6	F	Indonesia	Indonesian	6 months - 1 year	French, German, Spanish
P7	M	Germany	German	6 months - 1 year	Chinese
P8	F	United States	English, French, Spanish	6 months - 1 year	Arabic
P9	M	United Kingdom/Singapore	English	6 months - 1 year	Chinese, Indonesian, Spanish
P10	F	Singapore	Malay	Less than 6 months	Japanese

Self-management

- Specific **goals** can lead to improved performance, and learners' learning goals can be self-initiated or technology-defined.
- Distractions from daily living may make **time** management difficult, both physically and psychologically.
- A single MALL tool like Duolingo is not enough to master a language in all dimensions; as a result, they seek and manage other **resources** to complement their learning.
- Both human and material **resources** can be used to complement Duolingo learning.

Self-management



Interviewee #2

"I think my biggest suggestion, as I mentioned a little earlier, is just don't use Duolingo as your only resource. Because particularly nowadays or for any language, there are so many other resources out there and there are certain things that each of them does better or worse than the others."



Interviewee #9

"My opinion on that is since Duolingo is a non-human system, I think to have a human tutor at the end of a section would actually be a nice relief, a nice change of pace."

Self-monitoring

- Learners self-monitor their learning process through **feelings of knowing, content evaluation, and the judgment of the adequacy of information available**. Learners can spontaneously recognize the content they learned in Duolingo when they unconsciously encounter the language in daily life. However, they fail to recall the entire knowledge base that they learned with accuracy or completion.
- Learners highly rely on technology to monitor their learning through habit reinforcement and tracking.

"Well, what I can do now is when somebody is talking in French, I know that is French. I can identify some really simple French dialogue when somebody says it."

Interviewee #5



Motivation

- Learners are mostly driven by intrinsic needs and interests, such as culture, travel, and brain training.
- Learners use tools like Duolingo to gain a sense of achievement and fulfillment through maintaining streaks, progressing learning, organizing events, and socializations.

"Because sometimes you just lay on your bed, watch some operas or reality shows and do nothing, but then your Duolingo pops and you'll learn French for five minutes, and you feel really good about yourself. I don't think people will interpret this way, but it helped me to build up this positive energy for life."

Interviewee #5



Discussion

- Böhne et al. (2002) indicated that students struggled in a web-based learning environment due to a **lack of ways to obtain help** when needed.
- Tutor support is crucial in SDL because a tutor can facilitate planning the learning process, clarify content, and even provide technical support (Böhne et al., 2002).
- The lack of research on resource management strategies might be due to the fact that most prior research either took place in **formal learning settings** where teachers are present and can provide both human and material resources or investigated what resources learners use towards a target language (e.g. English).

Discussion

- Findings indicate that learners seek an integration of internal and external evaluations to self-monitor and make judgments of the effectiveness of their learning process.
- Finding suggests that language learning tools might be designed to align with language standards to improve the accuracy of learners' self-evaluations of their learning processes and accomplishments.

Discussion

- This study found that nine of the ten interviewees were strongly driven by **intrinsic motivators**, such as social engagement and personal interests, though extrinsic motivation such as for school or obtaining a VISA may also exist.
- It suggests that curriculum developers and instructional designers may seek a way to bridge students' language learning **requirements** with the students' **innate interests and needs**, such as socialization.
- By doing so, it might close the gap between students' **highly desired** learning of languages often pursued **informally** with their academic needs in **formal** classroom settings.

THANKS

Do you have any questions?
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