

Language Learning Showdown: Duolingo vs. Traditional Classroom - A Data-Driven Comparison



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IMT-570: Data-Driven Organizational Problem Solving For

Information Management Professionals

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I. Introduction and Background

A. Executive Summary

This research aims to identify the most effective language learning method for college students, comparing traditional classroom learning with virtual learning via Duolingo. The objectives are to assess the impact of both methods across five key themes (Appendix D-2). Language learning is influenced by individual styles, making it essential to optimize methods for diverse learners. Duolingo offers flexibility and a modern approach, while traditional classrooms provide structure, interaction, and immediate feedback. The study uses a mixed-methods approach, including surveys, case studies, and interviews. Surveys on the subreddit r/languagelearning gathered data on users' preferences and perceptions. The case study involved daily Duolingo use for 30 days, providing detailed feedback. Interviews with eight University of Washington undergraduates offered comparative insights. Ethical considerations ensured anonymity and respectful handling of data. Findings from interviews and surveys revealed that most respondents find classroom learning more effective due to its structure, speaking practice, and motivation. Duolingo's convenience and flexible approach are praised based on the case study, but its lack of deadlines can hinder consistent outcomes. Additionally, interview participants emphasized the importance of interaction and cultural comprehension in classrooms. Duolingo is noted for flexibility but criticized for oversimplification and limited practical usage. The study suggests a decision-making framework as the final recommendation: classroom settings are recommended for those prioritizing proficiency and interaction, while Duolingo suits learners seeking flexibility and entertainment. Preferences are categorized into six main categories, offering tailored recommendations based on individual preferences.

B. Problem Statement

The goal is to find out which learning method would be the best fit for students. Based on this goal, we aim to provide valuable insights that empower college students to make informed decisions regarding their interest in learning a language.

To assist them in solving this problem, our group compared two distinct approaches to language learning in this research: studying in a traditional classroom versus studying on a virtual platform offered by Duolingo.

For the boundaries of our study, our group decided to focus on college students because “about 60% of U.S. learners are under 30” (Blanco, 2022), considering this age group has the most people going to college. Our Duolingo user targets are more widespread since we can find them online. On the other hand, for traditional classroom learners, we specifically target students taking a language course at the University of Washington.

C. Research Objectives

Our research is guided by two primary objectives. First, we seek to evaluate Duolingo's impact compared to the structured classroom environment using five themes (Appendix D-2) and make recommendations tailored to assist students in selecting the language learning approach that aligns most closely with their individual goals.

Secondly, we endeavor to dissect which method fosters a deeper understanding of cultural nuances and facilitates effective language use in real-life scenarios.

D. Background

Language learning is a complex process influenced by various individual differences, especially learning styles. Learning styles “refer to Appendix A-1.1”(Pashler et al., 2008). Learners “refer to Appendix—A-1.2” (Pashler et al., 2008). According to this journal, understanding these styles is essential to optimizing language learning methods to cater to diverse learners. Various techniques are available to accommodate these differing styles. One of the most popular modern methods is Duolingo; it " refers to Appendix A-2” (Blanco, 2022). Contrastingly, traditional classroom learning remains a conservative learning style. This method offers a structured approach with direct interaction between students and teachers, immediate feedback, and collaborative learning opportunities with classmates. Classrooms can “refer to Appendix A-3” (Dos Santos, 2017).

Nowadays, most students who are interested in learning a language face these two distinctive learning methods. Choosing the most effective language-learning method becomes the first challenge for them. Each method has distinct advantages and limitations. For instance, “refer to appendix A-4” (Payaprom, 2020).

II. Approach and Methodology

To compare the effectiveness of Duolingo and the classroom environment, the study analyzes survey results, a case study, and interviews to provide a data-driven recommendation for students who need clarification on which method offers the best outcomes.

A. Sample Selection

The survey employs a non-probability sampling method specifically tailored to the unique needs of language learners in the United States. This approach ensures that the study's findings are directly relevant and beneficial to those learning a language other than their native tongue.

B. Validity and Reliability of Data Collection Procedures

Survey

The survey was posted on Reddit under the subreddit r/languagelearning. Its primary motivation is to gather more information about the target population to perform further analyses and understand the most crucial considerations language learners prioritize. When constructing survey questions, example input was included, and valid data types were enforced for optimal data collection. A significant limitation of the survey was that it was only posted to one subreddit. Knowing that responses are encouraged by online community members, it may be possible to garner more relevant responses in a large-scale study with time and resources.

Case-Study

The project utilized a 30-day case study to gain firsthand experience with Duolingo, exploring its features and functionality. Kelvin, one of our group members, was tasked with learning one Korean lesson per day on the app, aiming to fluently memorize all the characters fluently taught. The data collection focused on Kelvin's detailed feedback, including his experiences with the user interface, the effectiveness of the lessons, his motivation to continue using the app, and any challenges he faced during the daily learning process. At the end of the study, Kelvin provided comprehensive feedback, highlighting the advantages and disadvantages of Duolingo for learning Korean (full journal can refer to Appendix B).

Interview

We utilized purposive sampling to select participants who would provide relevant information for our study. Our sample consisted of 8 undergraduate students from the University of Washington currently enrolled in different levels of Chinese language courses. All participants also had experience using Duolingo, ensuring they could offer comparative insights. This selection was crucial for obtaining in-depth comparative data (Appendix D).

We plan to use a thematic analysis approach to conduct qualitative data analysis (refer to Appendix D-1). In the final report, we will use the theme we found to support our impact and recommendations.

C. Ethical Considerations

Ethical considerations about the survey results require anonymity and ensure no personal identification information is asked or retained. Furthermore, well-educated responses and replies in the forum were enforced and used to mitigate possible harm and prevent any form of cyberbullying.

III. Findings and Analysis

A. Survey Findings

Under the span of seven days in which the survey was posted, with 10,000 views, there were fifty-nine respondents.

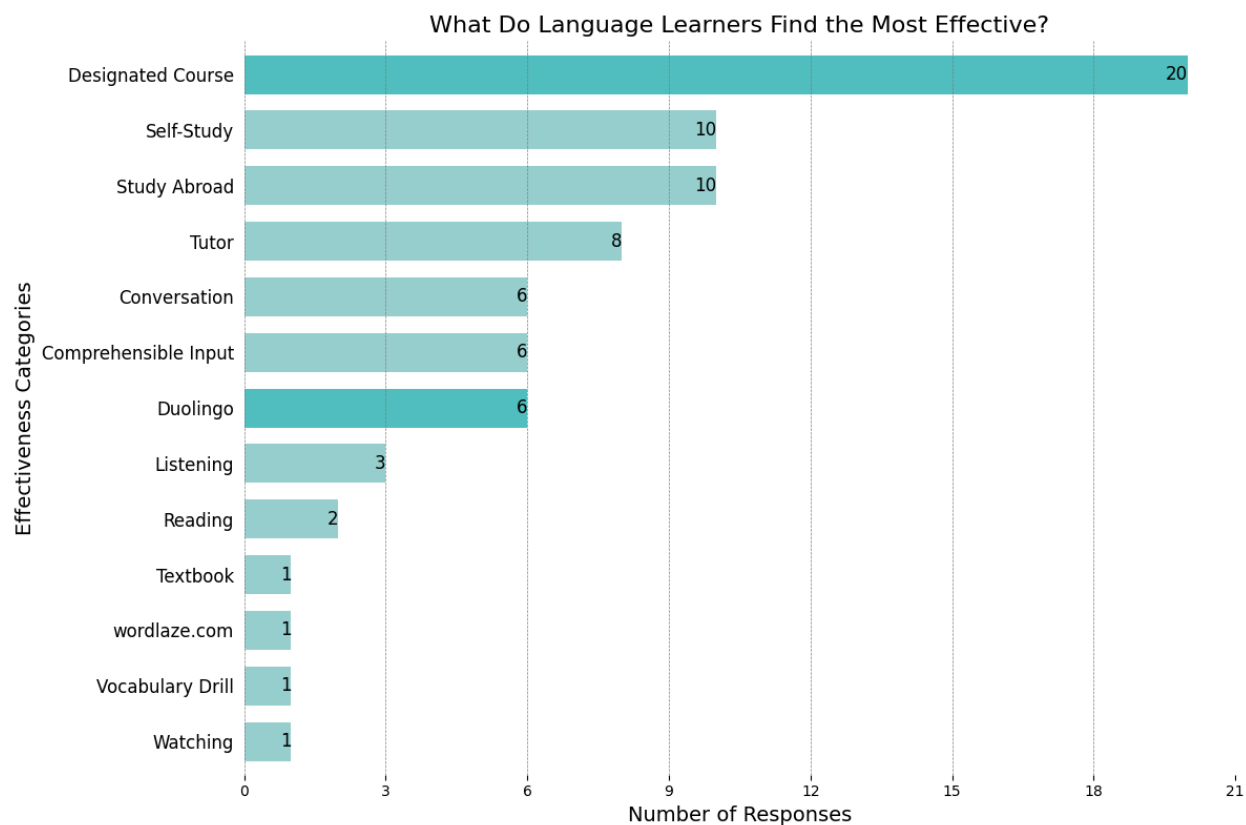


Figure 1-Survey results of most effective methods to study a language

Figure 1 shows that compared to a “Designated Course” and “Duolingo,” most survey respondents see the classroom setting as much more effective. According to some respondents, the classroom setting environment is found to be more “structured,” “more opportunities to speak,” and “more motivated to learn.” This observation may show the main differences between selecting language learning methods, as some people might opt for less flexibility and more structure. Others might prefer more flexibility and less interaction, such as self-study, tutoring, and Duolingo.

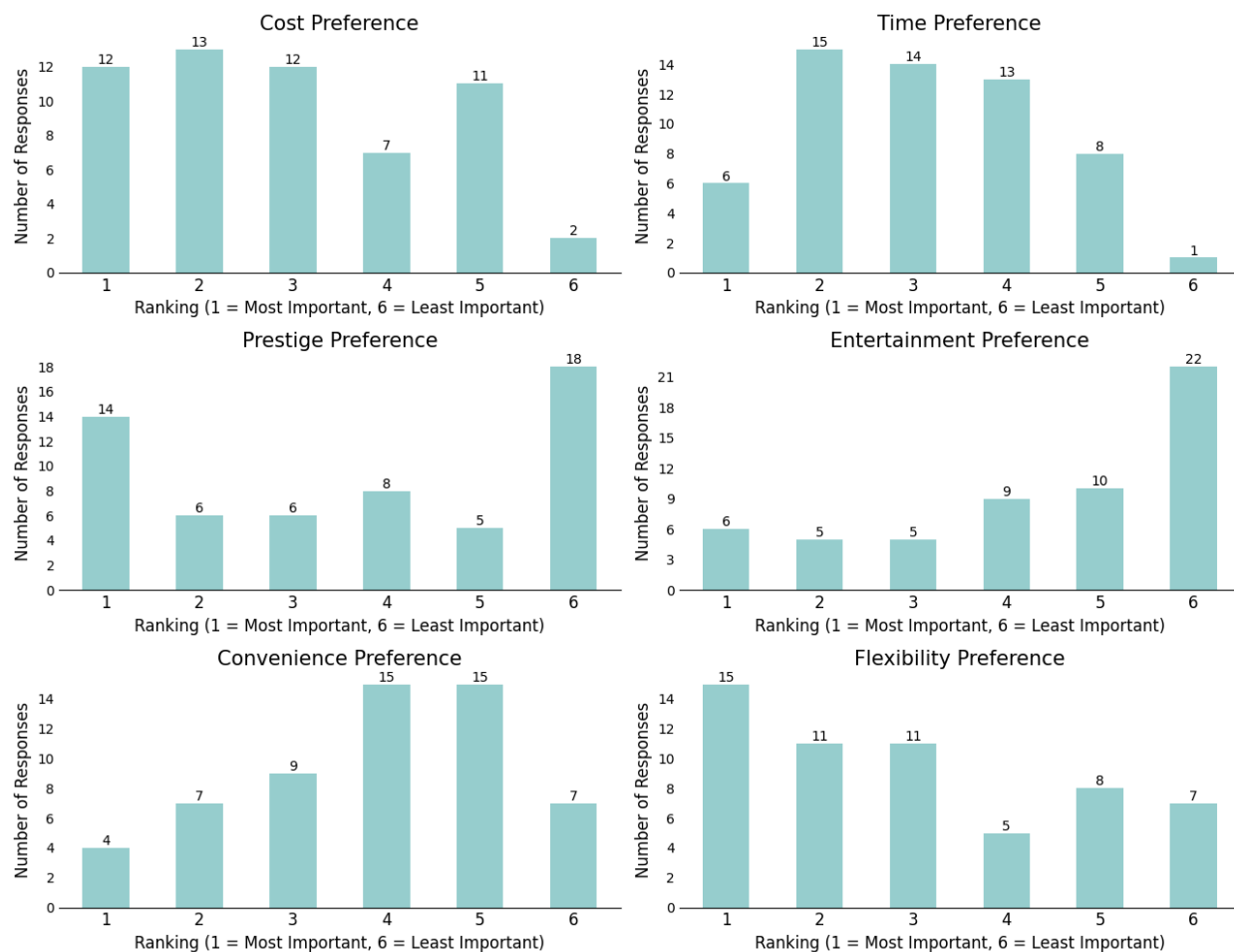


Figure 2-Survey results on what factors learners prioritize when choosing a method

Figure 2 illustrates the responses for each preference category and their respective distributions. The data reveals a slight right-skew in the Flexibility Preference plot, indicating that more people rank “Flexibility” higher than the other categories. Conversely, the Entertainment Preference plot shows a definite left-skew, suggesting that learners do not prioritize entertainment in their language learning process. Interestingly, the Prestige Preference plot displays two extremes, with some learners valuing prestige highly while others not valuing it. This may imply that some people focus solely on learning while others emphasize credentials. The Time Preference plot indicates that respondents do not consider it the “Most Important” factor, but still relatively significant. This discrepancy could be explained by trade-offs with another preference, such as Prestige. Further analyses and data would be needed to establish these trade-off relations. The Cost Preference plot shows a slight left-skew. Previous data indicates that most respondents find a classroom setting most effective. This shows a connection, as classroom settings offer less convenience but more prestige.

B. Case-Study

Using Duolingo, we identified factors influencing user engagement, satisfaction, and language learning outcomes. We discovered how easily users can understand characters, words, and writing without external help. These insights could guide strategies to improve platform effectiveness and usability (Appendix B-1: Case Study Journal, 2024).

Consistent daily practice is crucial for good learning outcomes; otherwise, proficiency may fall short compared to a structured class with deadlines and assignments to keep the learner motivated (Appendix B-2: Case Study Journal, 2024).

A significant limitation of this method is the need for a longer simulation period. Extended use helps users understand Duolingo's teaching mechanics without formal class materials or human interaction. More extended simulations yield more comprehensive data and more accurate expectations.

C. Interview

We interviewed eight students with questions about our designed themes: flexibility and Engagement, Interactive Learning and Participation, Application and cultural comprehension, Oversimplification and Practical Usage, and Pronunciation and Learning Outcomes (Refer to Appendix D-2).

All participants were native English speakers currently enrolled in Chinese language classes and had Duolingo experience. The table below shows the overall analysis of the common theme (Refer to Appendix D-2).

IV. Recommendations

In support of the results and analysis, the suggested optimal learning method in a classroom-setting environment over Duolingo is organized into six main choices: time, flexibility, entertainment, prestige, proficiency, and interaction. Thus, the recommendation on choosing a classroom setting or Duolingo will be based on the user's selection and, at most, the top three preferences. For example, if said user selects two choices from the classroom setting and one from Duolingo, our solution algorithm is to provide a classroom-setting recommendation. As there are six choices, there will only be at most four possible outcomes, as shown in the table below.

Combination from Each Category (Duolingo : Classroom-Setting)	Outcome
2:1	Duolingo
3:0	Duolingo
1:2	Classroom-Setting
0:3	Classroom-Setting

The motivation and reasoning of the six categories are explained in the table below.

Our Data-Driven Approach

Q: What do you prioritize when you want to learn a language? Select your top three.		
Classroom-Setting		Data Reasoning
Prestige	The student prioritizes quality and a more structured setting.	According to the Theme “Interaction Learning and Participation,” “Application and Cultural Comprehension,” and “Oversimplification and Practical Usage” in our interview findings.
Proficiency	The student prefers a more in-depth exposure and study of the language.	The survey respondents indicate that learners find the classroom most effective, suggesting that they can obtain a deeper understanding of the language (refer to Figure 1). Interviewees also claimed that
Interaction	The student favors in-person learning with peers.	According to the Theme “Interaction Learning and Participation,” “The structured, in-person classes are crucial for my learning. The interaction with professors and teaching assistants helps me grasp complex concepts more effectively.” – Interviewee 6 (Appendix D-2).
Duolingo		
Time	The student doesn’t have much time to study.	According to Kelvin’s journal, he mentioned, “I can learn the language every day even though I was busy the whole day because each lesson only took 5 minutes”(Appendix B). That is

		the reason why “time” is considered Duolingo’s advantage.
Flexibility	The student prefers to learn anywhere at any time.	The survey respondents ranked Flexibility as one of the most essential aspects when considering learning methods (refer to Figure 2).
Entertainment	The student prefers a fun way to study instead of taking class.	According to Kelvin’s journal, he mentioned “using Duolingo is like playing a game at the same time I could still learn the content”(Appendix B). That is the reason why “time” is considered Duolingo’s advantage.

The study's limitations mainly include its focus on two categories. With extended time and resources, more categories can be included—tutoring and self-study. Furthermore, choosing Duolingo as a comparison method significantly narrows down the language learning audience, and thus, expanding the category may encapsulate a broader and more diverse range of respondents.

V. References

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VI. Appendix

Appendix A

	Concept	Quote	Explanation/ Add-ons
A-1.1	Learning style	Learning styles refer to the “preferred ways individuals absorb, process, and	N/A

		retain information. These styles can be broadly categorized into visual, auditory, reading/writing, and kinesthetic” (Pashler et al., 2008).	
A-1.2	Learning style	“benefit from images and diagrams, auditory learners from listening and speaking, reading/writing learners from text-based input, and kinesthetic learners from hands-on activities” (Pashler et al., 2008).	For different learners, they have to choose different learning styles in order to have the best outcome.
A-2	Duolingo	“leverages gamification and interactive lessons to engage users, making it particularly appealing to visual and kinesthetic learners. Duolingo provides a flexible, self-paced learning environment that can be accessed anytime, anywhere” (Blanco, 2022).	That is the biggest reason why a large number of learners chose Duolingo as their learning method: it best matches their learning style.
A-3	Classroom Learning	“provide comprehensive lessons that incorporate all	Although Duolingo provides the best convenience, the outcome of learning

		learning styles through lectures, visual aids, reading materials, and hands-on activities. However, it requires regular attendance and a more rigid schedule compared to online learning options” (Dos Santos, 2017).	on Duolingo will not be the same as learning from a traditional classroom. Classroom learning would be costly but it would be practical and guarantee at least a decent learning outcome.
A-4	Choosing the right method	“While Duolingo's interactive platform may be highly engaging for some, others might benefit more from the structured and immersive environment of a classroom. Additionally, the availability of resources, such as time and access to technology or classes, can influence this decision” (Payaprom, 2020).	Comparing both methods and then applying to the student’s own circumstances would be the first action those students would take.

Appendix B - Case Study Journal - Full Journal

<https://docs.google.com/document/d/1cEO2kfnbzA4rW2McWoO1NyhZo6SJXyWmSO1NzyPc8H0/edit?usp=sharing>

Appendix B-1 - Case Study Journal Screenshot 1

Appendix B-2 - Case Study Journal Screenshot 2

13 May Day 15

- a. Daily lesson - practicing the characters learned from lesson 3.1.
- b. Section1 Unit 1 : Learn Korean Vowels - lesson 3.1. Did 1 exercise and took notes while learning - around 10 min, afterwards practicing the writing and speaking - around 10 min (Total - 20 min)
- c. Some letters are challenging to pronounce
- d. I started to identify the characters faster based on their common letters. With the letter cards feature on Duolingo, I was able to memorize the characters faster and easier without asking anyone's help.

Part 2 - Overall Assessment:

At the end of the journal, share how much you have learned over the 1-3 weeks, at the same time rate the chosen language learning method on a scale of 1-10. User will also attend an interview to share this feedback with other group members.

After completing the case study, I found out that in order to have a good learning outcome only using Duolingo and only studying by myself, I have to have very strong self-control. I have to be consistent to take lessons everyday. Sometimes I was busy the whole day, and I didn't have time or just felt lazy; I missed a Duolingo practice at the end.

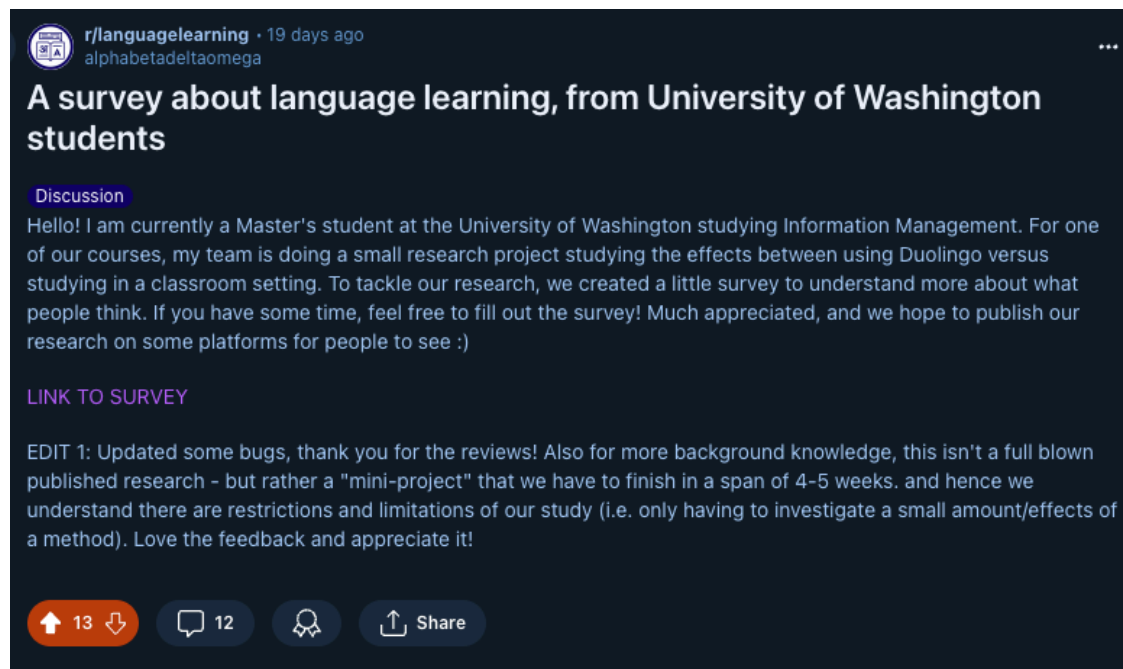
If this happens more than once, I will potentially lose interest in learning using Duolingo daily and forget about the language at the end. Self-control is essential in this learning method; if a person has weak self-control, then there is a good chance that he/she won't learn the language successfully.

Appendix C- Survey Link, Question, and Results

Appendix C-1 Survey Link

https://ischooluw.co1.qualtrics.com/jfe/form/SV_b1uWua8X23zID5A

Appendix C-2 Reddit Page



Appendix C-3 Data Sheet/CSV/Python File

- [Python File for Visualizations](#)
- [Survey Data File](#)

Appendix D - Interview Questions and Results

https://docs.google.com/document/d/1caaCHVzoev2iiPEHIVkt_zRgroJSuzz1RWBK775Tye8/edit

Appendix D-1: Thematic Analysis Approach for Interview

Themes	Approaches
Initial Coding	We will read through the transcripts to identify initial codes. This involves highlighting phrases or sentences that appear significant or interesting.
Generating Themes:	Codes will then be grouped into broader themes that capture important patterns in the data.

Reviewing Themes:	These themes will be reviewed to ensure they accurately reflect the data and are relevant to our research questions.
Defining and Naming Themes:	Each theme will be clearly defined and named to reflect its essence.

Appendix D-2: Interview code book with interviewee quotes

Theme	Observation	Insight	Representative Quotes
Flexibility and Engagement	All participants acknowledged Duolingo's flexibility and appreciated its interesting interaction, which increased their engagement levels after class.	This theme was consistently noted, highlighting Duolingo's ability to maintain user interest through flexible learning.	"I love how flexible Duolingo is. I can fit in a lesson whenever I have a few minutes, which makes it so much easier to keep up with my language practice." – interviewee 3
Interaction Learning and Participation	Participants emphasized the significance of structured, in-person classes that foster active learning through professor and teaching assistant engagement. They valued the opportunity to ask questions, especially about nuanced aspects like pronunciation.	The theme of interactive learning was strongly emphasized, indicating the benefits of in-person engagement over solitary app-based learning.	"The structured, in-person classes are crucial for my learning. The interaction with professors and teaching assistants helps me grasp complex concepts more effectively." – interviewee 6
Application and Cultural Comprehension	Participants pointed out the lack of cultural comprehension in Duolingo, which led to difficulties in applying the language in real scenarios. In contrast, traditional classes integrated cultural elements that enhanced their learning experiences.	The absence of cultural context in Duolingo was a common concern, highlighting a significant gap in the app's curriculum.	"Duolingo is great for basic language practice, but it lacks cultural context, which makes it hard to apply what I've

			learned in real-life situations." – interviewee 4
Oversimplification and Practical Usage	Participants noted Duolingo's tendency to oversimplify words and focus on translation rather than practical usage, often repeating questions to reinforce patterns instead of promoting real-life application.	This recurring theme highlighted a limitation in Duolingo's approach to language teaching.	"I noticed that Duolingo often repeats questions to reinforce patterns, but this doesn't always translate to practical language use in everyday situations." – interviewee 6
Pronunciation and Learning Outcomes	Interviewees 2 and 3 emphasized that traditional language classes focus more on sentence structure and grammar, leading to positive learning outcomes. However, only interviewee 1 felt that Duolingo excelled in helping with her Chinese pronunciation.	The mixed feedback on pronunciation and learning outcomes reflected varied perceptions of Duolingo's effectiveness	"For me, traditional language classes are invaluable because they provide a comprehensive understanding of grammar and sentence structure, which Duolingo doesn't cover as thoroughly." – interviewee 8