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Exploring the Impact of Gamification on User Engagement and Motivation

Gamification and Usability's Influence in Duolingo

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Abstract

This study uses the language learning app Duolingo as an example to explore the impact of its gamified design on user motivation and engagement. To ensure the accuracy of the results, a mixed-method approach was adopted for cross-validation. This included a preliminary survey in questionnaire form to understand users' perceptions of gamification mechanisms, followed by diary studies to authentically record usage scenarios and semi-structured interviews to gain deeper insights into participants' experiences. Subsequently, a theoretical framework combining Nielsen's usability heuristics, Self-Determination Theory, and the Octalysis Octagon Model was used to conduct a novel analysis of the experimental results.

The results showed that Duolingo's encouragement mechanisms are mostly successful in motivating users to learn and promoting participation, but they also impose an emotional burden on users. However, penalty mechanisms are significantly associated with decreased motivation. Although they are believed to ensure answer accuracy, they also trigger noticeable anxiety and frustration among users.

These findings offer helpful information by understanding how gamification influences user learning experiences and emotional responses. By examining both the benefits and disadvantages of gamification through usability and psychological aspects of users' motivation in the widely used language learning application, this study can contribute valuable insights to future research and even practical guidance for designers and developers to create more effective and user-centred gamification systems for educational platforms.

Keywords: Gamification, User Experience, Usability, Duolingo

Table of Contents

Abstract **2**
1 Introduction **5**
1.1 Problem Statement 5
1.2 Purpose and Research Questions 5
1.3 Scope and Limitations 6
1.4 Disposition 6
2 Theoretical framework **7**
2.1 Nielsen's Usability Heuristics 7
User Experience in Mobile Applications 7
Gamification and Usability 8
2.2 Self-Determination Theory 8
Gamification and Motivation 9
2.3 Octalysis Framework 9
Behavioural Influence 10
3 Method and implementation **11**
3.1 Data Collection 11
Survey 11
Diary study 11
Semi-structured Interviews 12
3.2 Data Analysis 14
Questionnaire data analysis 14
Diary study data analysis 15
3.3 Validity and Reliability 16
Validity 16
Reliability 16
3.4 Considerations 17
4 Results **18**
4.1 Introduction to the Results Chapter 18
4.2 Behavioural Indicators of Engagement and Motivation 18
4.3 Encouragement Mechanisms 18
4.3.1 Streak 18
4.3.2 Leaderboard 20
4.3.3 Achievement system 21
4.3.4 Random encouragement mechanism 21
4.4 Penalty Mechanisms 22
4.4.1 Life points (Hearts) 22
4.4.2 Forced repetition 24
4.5 Other Findings 24
4.6 Data Analysis 25
4.6.1 Addressing Research Question 1 25
4.6.2 Addressing Research Question 2 27

5 Discussion..... 29
5.1 Result Discussion..... 29
5.2 Method Discussion..... 33
6 Conclusions and further research..... 37
6.1 Conclusions..... 37
6.1.1 Practical Implications..... 38
6.1.2 Scientific Implications..... 38
6.2 Further Research..... 38
7 References..... 40
8 Appendixes..... 44
Appendix 1 Survey questionnaire template..... 44
Appendix 2 Diary template..... 46
Appendix 3 General Questions list (for all participants)..... 47
Appendix 4 Personalised Questions list (for specific participants)..... 48
Appendix 5 Interview record（P1-P12）..... 51
Appendix 6 Gamification Feature Technical Term Explanation..... 66
Figures..... 68
Table. User diary record..... 73

1 Introduction

Gamification is a new method that has been proposed in the past decades and adds game elements such as scores and rankings to non-game scenarios. Also, it has been used in software development to make the content more motivating, to improve the user experience (Deterding et al., 2011).

Nowadays, with the fast development of society, paperless learning is becoming a fashion trend. People are more willing to take the time to learn a new language and try to engage in paperless studying on mobile phones or computers. (Chun et al, 2016). Therefore, these types of learning applications are increasingly appearing.

Duolingo is a leader in this type of application. As early as ten years ago, it attracted more than a hundred and fifty million users (Munday, 2017) and rich gamification content was included. It boosts the learners' motivation by adding features such as streaks, achievements, and leaderboards (Huynh et al., 2016).

1.1 Problem Statement

Although the goal of gamification is to improve the user experience, some current research suggests that the misuse of gamification may harm the user experience. According to Mekler et al. (2013), common gamification features such as points, levels, and leaderboards, while motivating users in the short term, can undermine intrinsic motivation in the long term and users' attention may also be focused on rewards rather than the task itself.

In addition, the views of Fuchs et al. (2014) also clarify that the current application of gamification in software tends towards "pointsification", where external incentives replace intrinsic motivation.

1.2 Purpose and Research Questions

This research aims to explore the effects of gamification design on user experience, particularly focusing on motivation and engagement. Motivation and engagement are important aspects of learning because with them learners will have the ability to continue their studies and achieve their goals. Hence, by exploring how gamification mechanisms affect user experience, the research can understand the factors that contribute to both positive and negative user experiences. Additionally, this research analyzes users' feelings on gamification design and finds out the factors that may have an impact. It also proposes possible optimisation suggestions based on the experimental results and provides a reference for language learning application designers.

Research question 1: In Duolingo, how do encouragement mechanisms such as streaks, achievements, and leaderboards affect users' engagement?

Research question 2: How do failure penalty mechanisms in Duolingo, such as running out of hearts or forced repetition, affect users' motivation?

1.3 Scope and Limitations

As mentioned previously, Duolingo is a language learning platform that deeply integrates gamification with a large user base and has a wide impact. However, there is currently a lack of specific research on the impact of the gamification design of Duolingo on the user experience. There is a research gap in this area. However, at the same time, we must admit that there are also limitations in the research, due to the study of a single application. Although Duolingo has a large number of users, there may be significant differences in the use of gamification elements and user experience between different applications. Therefore, the universality of the research results is limited.

1.4 Disposition

The rest of the article will be structured as follows. The second chapter analyses the three theoretical frameworks which include Nielsen’s Usability Heuristics, Self-Determination Theory, and Octalysis Framework. The third chapter presents the method and implementation, and it will illustrate how we will conduct the survey, how the diary study will be conducted, and how the semi-structured interviews will be conducted. In the fourth chapter, the results of the surveys and investigations will be collected, while the fifth chapter discusses the discussions based on the analyses. Finally, the sixth chapter concludes all the studies and lists suggestions for further research.

2 Theoretical framework

In this section, theoretical frameworks will be introduced to be utilized in the study of Duolingo's gamification and user experience, and how Duolingo employs its gamification features to impact user experience. The three main theories that will be focused on for the research are Nielsen's Usability Heuristics, Self-Determination Theory (SDT), and Octalysis Framework. These theoretical frameworks form the foundation for the study. These ideas will help us examine gamification effects, user motivation and engagement, and interaction design in Duolingo.

2.1 Nielsen's Usability Heuristics

Usability is an important aspect of user experience design. It directly influences how easily and efficiently users can navigate, understand and complete tasks in a system. One of the most famous frameworks is Nielsen's Usability Heuristics developed by Jakob Nielsen in 1993. Nielsen's Usability Heuristics are a well-known set of principles of digital interface design based on the problems users face when using digital systems. The heuristics have been extensively studied and applied in human-computer interaction (HCI), user experience (UX) research, et cetera.

The framework consists of 10 principles, including Visibility of System Status, Match Between the System and the Real World, User Control and Freedom, Consistency and Standards, Error Prevention, and more (Nielsen, 1993). These principles are not strict rules but rather flexible guidelines that help web designers identify usability flaws in digital products. Each principle highlights an important aspect of usability and guarantees that users can use the system efficiently with the least amount of difficulty. In studies regarding usability, heuristics are often employed as an evaluation tool to find interface issues that could otherwise go overlooked in normal user testing.

In language learning apps like Duolingo, usability is important for maintaining learning flows and enhancing user experiences. When users can easily navigate content and receive feedback, they are more likely to be motivated and engage with the apps. Nielsen's Usability Heuristics will help analyze the way Duolingo's design affects users whether it supports or hinders their experiences.

User Experience in Mobile Applications

In the past decade, mobile technology has been evolving and thriving. The number of applications published has been rising day by day. More and more developers and UX/UI designers are paying attention to how to create good-quality applications. Usability has become a crucial factor in assessing an application's performance.

According to Weichbroth (2020), a literature study about the definition of usability in mobile applications shows that over seventy-five attributes identified and analyzed in the HCI community, the most frequent are efficiency (70%), satisfaction (66%) and effectiveness (58%) which directly originate from the definition shown in Weichbroth's study.

Gamification and Usability

Claimed by Koivisto and Hamari in 2019, gamification refers to designing information systems that afford experiences and motivation that are similar to those in game systems in order to influence user behaviour. Gamification's popularity has exploded in recent years as shown by the rise in gamified applications as well as a rapidly increasing amount of research. In educational technology, gamification aims to make the learning process more interactive and interesting. While gamification can bring some positive effects, its effectiveness depends on how well it aligns with usability principles. Poorly utilized gamification features can lead to confusion, cognitive overload or unnecessary pressure that reduces user experience.

These aspects can be the parts that this paper can cover and dive into when talking about user experience, specifically usability and gamification in Duolingo. With the help of Nielsen's Usability Heuristics, this paper can study and analyze the subject precisely and go through every central aspect of Duolingo.

2.2 Self-Determination Theory

Self-Determination Theory (SDT) is a psychological framework that explains human motivation. SDT was developed by Ryan and Deci (2000) and still remains an influential framework in motivation research. According to SDT, humans have 3 basic psychological needs: autonomy, competence and relatedness, that underlie growth and development.

Autonomy refers to the experience of having choices and willingly endorsing an individual's behaviour. On the opposite side, there is the feeling of being compelled or controlled in one's behaviour. When people feel that they can make meaningful choices, they are more likely to be motivated.

Competence refers to the experience of mastery and being effective in one's activity. SDT claims that people are more engaged when they feel a sense of progress and achievement.

Relatedness refers to the need to feel connected and a sense of belonging with others. According to Ryan and Deci in 2000, motivation improves when people get along within a community or social setting.

When these needs are fulfilled, users are more likely to have intrinsic motivation, which is doing something that is in their own interests and enjoyment. In contrast, when the needs are suspended by some factors, users' motivation may decrease or even become extrinsic.

Gamification and Motivation

SDT has been popularly employed in gamification research to understand how digital systems influence user motivation. Gamification in applications can align highly with SDT by focusing on autonomy, competence and relatedness to enhance user engagement. Koivisto and Hamari (2019) found that gamification can improve the user experience when aligned with usability heuristics and psychological needs, yet when the design is poorly optimised, it can cause cognitive overload and frustration, leading to decreased user motivation. For instance, Duolingo's streak system encourages users to continue studying daily. This can be a good motivator that increases user engagement. However, when users feel compelled to maintain the streak out of fear of losing the streak instead of enjoyment, it may lead to unnecessary pressure.

Moreover, a study by Sailer et al. (2017) shows that different gamified elements tend to cover different psychological needs. In Duolingo, there are some features that support central aspects of SDT, for example, competence with leaderboards and badges, relatedness with friend tasks and more. By knowing how to design and utilise those features thoroughly, gamification can create a balance that sustains motivation over time, making the learning process more interesting and engaging.

On the other hand, understanding how autonomy, competence and relatedness influence user engagement can support designers to assess the effectiveness of gamification and enhance user motivation.

2.3 Octalysis Framework

Yu-kai Chou's Octalysis Framework (2015) is an innovative approach to gamification that uses eight Core Drives to analyze human motivation. The Octalysis Framework makes it possible to create experiences that are both engaging and inspiring by analyzing these Core Drives, which are the basic elements that drive human actions.

As mentioned, there are eight aspects of the framework that can be considered to align with the topic of this study. For Duolingo's gamification and its usability impacting user experience, the eight Core Drives are:

1. **Epic Meaning & Callin**g: Feeling part of a greater mission.
2. **Development & Accomplishment:** Progress and mastery.
3. **Empowerment of Creativity & Feedback:** Interactive problem-solving.
4. **Ownership & Possession:** Collecting rewards.
5. **Social Influence & Relatedness:** Competition and collaboration.
6. **Scarcity & Impatience:** Limited-time challenges.
7. **Unpredictability & Curiosity:** Randomized rewards.
8. **Loss & Avoidance:** Fear of losing progress (Duolingo's streak system).

These Core Drives can help explain different ways users can be motivated or demotivated. In Duolingo, each drive can be a part of one or many features which makes the users' experiences more varied, influencing different users in both positive and negative ways.

Behavioural Influence

The Octalysis Framework is one of the new and advanced frameworks used to evaluate gamification aspects of digital systems. As noted by Tondello et al. (2019), gameful factors can increase engagement and generate desired behavioural outcomes. By employing the Octalysis Framework in gamified applications, the gamification elements of these applications can be observed in how they encourage user engagement, learning motivation and behaviour influence. In Duolingo, the framework can assess how gamification mechanics impact user experience, whether through a sense of accomplishment, competition or loss, et cetera.

Aligning with SDT, the Octalysis Framework can be used as an advanced and gamification-centered aspect that helps study users' behaviour and the effect of Duolingo's gamification and usability on users.

3 Method and implementation

This chapter describes the methodology of this study, including data collection and analysis methods, as well as considerations of validity and reliability. The methodological framework is designed to address two research questions, namely, how incentives and penalties in Duolingo affect users' engagement and motivation, respectively.

3.1 Data Collection

Survey

According to Brown (2024), surveys can complement other qualitative research and provide valuable information. They provide quantitative information that will enhance the persuasiveness of the overall results.

Therefore, a structured questionnaire survey was the first step in the experiment. The aim is to get a basic understanding of how users use Duolingo and, hopefully, to collect extensive quantitative data on users' attitudes towards the encouragement and penalty mechanisms in Duolingo to support subsequent qualitative analyses and increase the credibility of the results.

The survey utilized a non-probability convenience sampling strategy. The researcher distributed an online questionnaire to individuals who were using or had used Duolingo through social media groups (e.g., WeChat, Discord, and Messenger) and personal outreach. Although there were limitations to this sampling method, convenience sampling was the most appropriate sampling method for this study due to the resources, time, and labour constraints of the current study (Etikan, 2016).

In addition, respondents who expressed a willingness to continue participating in the study in the questionnaire survey were invited to participate in the diary study to prepare for the next phase.

Diary study

Since this study aimed to analyse the impact of the gamification design of Duolingo on users and to answer the previously formulated research questions, this study needed to analyse the trends in users' engagement over time. In particular, the experiment needed to find out whether they had maintained their streak or whether some features were certain incentives for them to continue using the app. In addition, the experiment still needed to collect data on which features have an impact on motivation, in particular

when their heart count was low and the app forced them to do forced repetition. To collect these data, a method that allows for tracking user behaviour over a long period was used.

According to Kuniavsky et al. (2012), diary studies allow researchers to collect longitudinal data on users' real behaviours and experiences without affecting them. This allows researchers to discover issues that are difficult to discover in short-term studies. In addition, because of the nature of daily recording, users can record data in real time to reduce recall bias.

Therefore, diary studies are well suited to the objectives of this study. They allow users to record their real experiences and reveal the long-term impact of these features on users.

Semi-structured Interviews

Research by Zimmerman and Wieder (1977) proposed that the diary interview method can help researchers gain a deeper understanding of the content of the diary and obtain additional information. In addition, Cohen and Crabtree (2006) pointed out that semi-structured interviews can allow respondents to express their views more flexibly and allow researchers to pursue meaningful topics.

Semi-structured interviews helped researchers gain a deeper understanding of the content of the diary and thus obtain effective qualitative data. The interviews rendered information about the participants' understanding of their overall subjective feelings and common problems. In addition, special questions for each participant to supplement the missing information in their diaries were prepared.

Implementation

In the first phase of this study, researchers conducted a survey and expected to collect at least twenty valid responses. The survey questionnaire was to be sent to multiple groups and social media platforms in the form of a Google Form to collect sufficient quantitative data. The specific content of the questionnaire can be found in "**Appendix 1**: Survey Questionnaire Template."

The questionnaire was divided into two parts. The first part was basic information, where participants were asked about their background in using Duolingo, including whether they are paid members, how often they used it daily and how long they used the app for.

The second part formed the core of the survey, and a series of questions based on a five-point Likert scale were designed to quantify users' attitudes and emotional responses to Duolingo's gamification mechanisms. This part of the question revolved around encouragement mechanisms (such as Streaks, Achievements and Leaderboards) and punishment mechanisms (such as Health points and Forced Reputation). For specific functional descriptions, please refer to "**Appendix 6:** Gamification Feature Technical Term Explanation". Each mechanism contained two questions related to positive and negative effects, aiming to understand users' positive and negative subjective feelings towards these gamification mechanisms.

In addition, the questionnaire was used to initially recruit participants for the diary study. At the end of the questionnaire, there was an optional question inviting users who were interested in participating in the follow-up study to leave their email address.

In the end, twenty-four valid responses were received, and considering participants' willingness to continue and their Duolingo-usage background, twelve respondents were selected who were willing to continue to participate in the experiment.

In the second phase of the study, a diary study was conducted. Researchers selected twelve participants based on their usage background information obtained from the previous questionnaire and their willingness to continue participating. To ensure sample diversity, researchers specifically considered different usage scenarios. The final participants included new users who were using Duolingo for the first time, as well as long-term active users and users who had paused their usage and then returned. Participants were evenly distributed among the three researchers. The entire diary study lasted for seven days. At the beginning, the researchers distributed diary templates and explained the recording rules. The diary template can be found in "**Appendix 2** Diary template". In addition, researchers only contacted participants to provide instructions and remind them to write their diaries. No other interference with participants would occur. After all the diaries would consolidate, researchers consolidated the information into an Excel table for later collation and coding.

During these seven days, participants were required to write a diary entry every day based on their subjective feelings and using the diary template. If the participants experienced any interruptions in their use, they were to record the reason for this on the day. Also, if they resume the app after a break, they need to record any changes of mind.

In the diary, participants needed to record quantitative data, such as Streak records, the number of daily learning tasks completed, and the study time. They also needed to rate their motivation before starting to use the app and their subjective feelings after using.

These data, after being recorded multiple times, finally generated a longitudinal data set to help analyse changes in user motivation and engagement.

In addition, they were also asked to describe in detail what they did on Duolingo that day, what they liked, and what frustrated them. These data were coded in subsequent stages for thematic analysis to identify the main factors influencing users' motivation to continue engaging.

After the diaries were completed, each participant was interviewed using a semi-structured interview. The interview questions were divided into two categories. The first were general questions. These were prepared questions, whose purpose was to understand the overall impact that the gamification mechanisms may have on users, and questions based on the common problems found in the diaries to seek answers. General questions can be found in "**Appendix 3** General Questions list (for all participants)".

The second part comprised personalised questions. Researchers first conducted a preliminary analysis of each participant and identified any gaps in their responses or unclear expressions in their diary, then designed questions and follow up to supplement the diary data and ensure that the information was valid and in-depth. More information can be found in "**Appendix 4** Personalised Questions list (for specific participants)".

In addition, because the participants were located in different regions, the interviews were conducted online for convenience and efficiency. To reduce errors, researchers uniformly used Microsoft Teams and recorded the interviews. The purpose was to record the content of the interviews and transcribe them in preparation for later qualitative analysis.

3.2 Data Analysis

Due to the mixed-methods data collection plan in this study, the data analysis technique combined quantitative and qualitative approaches, which separately processed all questionnaires alongside diary and interview data. Different methods were used to analyse the various data types.

Questionnaire data analysis

According to Bruhl (2018), statistical analysis helps reveal the characteristics of the data and provides support for subsequent research, and since the questionnaire contains mostly quantitative data, it is appropriate to use statistical analysis to reveal the characteristics of the data.

The data were collected via Google Forms, and the results were initially presented in the form of charts. Researchers would further extract the mean and standard deviation of key variables to systematically identify trends in users' attitudes towards Duolingo's gamification elements, with a particular focus on the direction of influence of the encouragement and penalty mechanisms, and as a reference for qualitative analysis.

Diary study data analysis

Two stages make up the process of analysing data from the diary study. Firstly, researchers gathered daily participant measurements statistically (Number of streaks, daily learning lesson count and scores for motivation and feelings). These quantitative data would provide a contextual reference for fluctuations in user engagement and motivation, and support later thematic analyses.

Secondly, the subjective text records of the participants were analysed. The data analysis framework proposed by Alaszewski (2006, chapter 5) was applied using an inductive open coding method to identify recurring themes related to gamification elements. Firstly, researchers transcribed the different forms of qualitative information obtained from diary studies and interviews into text and set up a coding framework to classify the impact of the gamification mechanisms mentioned by the users into positive, neutral and negative. Secondly, the transcribed text was read repeatedly, to identify, to generate, and to categorize the codes according to the predefined coding frame. Subsequently, the data were compared continuously and generated new themes and concepts inductively to provide explanatory information and enhance the reliability of the analysis. Finally, the previously analysed quantitative data were combined to conduct a comprehensive analysis and answer the core research questions.

Interview data analysis

Since the main purpose of the interview was to supplement the diary content, most content was coded directly in the diary section. The specific coding was divided into positive, neutral and negative attitudes, and further classified into topics related to gamification mechanisms, such as ‘motivating factors’, ‘frustrating experiences’.

3.3 Validity and Reliability

Validity and reliability are key measures in academic research. To ensure the credibility of the results of this study, the study took various actions to safeguard these two dimensions.

Validity

The main research method of this study was a diary study, supplemented by questionnaire surveys and semi-structured interviews. Qualitative data and quantitative data were analyzed separately, and conclusions were drawn from multiple perspectives.

As suggested by Patton (1999, pp. 1192-1194), mixed methods and triangulation of data sources further enhanced the confidence of the results. Specifically, this study cross-validated data from questionnaires, diaries, and semi-structured interviews. For example, the themes identified in the diary topic analysis were compared with the corresponding mechanism scores in the questionnaire to elucidate the impact of each mechanism and to develop stronger chains of explanation.

To ensure the validity of the content, both questionnaires and diaries were designed on the basis of a comprehensive literature review and relevant theoretical frameworks, including the self-determination theory and the Octalysis Framework. These tools covered key dimensions such as encouragement and penalty mechanisms, user motivation and engagement. Prior to use, these issues were discussed in internal meetings to ensure clarity and applicability. As a result, these questions accurately captured the information needed for research and provided reliable answers to research questions.

Reliability

To ensure the reliability of this study, the following measures were taken. First, researchers established standards to ensure normative data. The questionnaire used standardized questions and used the Likert scale. For diaries, there was also a set of standardized templates and instructions. During the experiment, the researchers examined and alerted participants to errors in the diary format. The interviews were based on a pre-set outline of questions to avoid digressions during the interview. All interviews were conducted online and recorded and transcribed at the end.

Secondly, to ensure the relevance of the experimental data to the research questions, in the first step of the survey, participants were asked to confirm that they were currently using or had previously used Duolingo and were selected to participate in follow-up journal studies and interviews to avoid having irrelevant data influence the study results.

Finally, to ensure the reproducibility of the experiment, this experiment only used publicly available tools (such as Google Forms, Excel, and Microsoft Teams) and clearly explained the method of operation at each stage of the experiment so that other researchers could repeat the study process under the same conditions and improve the reliability of the study.

In summary, the study ensured the validity and reliability through standardized practices and multiple safeguards during the design, collection and analysis phases to help readers or other researchers trust the results and to repeat the experiment if necessary.

3.4 Considerations

In the field of human-computer interaction, ethical and moral factors should be given priority consideration (Bruckman, 2014). Therefore, ethical considerations were thoroughly taken into consideration during the design and implementation of this study. Prior to the commencement of the experiment, researchers clearly explained the purpose of the experiment and the intended use of the experimental data to participants to ensure their informed consent and their right to withdraw from the study at any time during the process. During the implementation of the study and the subsequent data collection and coding phases, participants' information was fully anonymized to protect their personal privacy and data security. All participants' personal information (including names, email addresses, and sensitive parts of experimental data) was fully anonymized. The relevant data were restricted to internal analysis by the research team and were not used for any other purposes.

4 Results

4.1 Introduction to the Results Chapter

This chapter derives its content from the experimental data. Initially, the impacts of gamification are classified and presented based on their characteristics. This chapter then presents engagement and motivation based on the user behaviour data. Lastly, an in-depth analysis of the experimental results was carried out with a focus on research questions. The integration of both quantitative and qualitative data intuitively depicts the effect that each type of mechanism has on user behaviour. The analysis is viewed from a cross-validation perspective.

Note: P1–P12 in the results data represent the identifying codes for the 12 participants. These codes were used throughout the text when referring to the participants' statements.

4.2 Behavioural Indicators of Engagement and Motivation

Regarding user engagement, the participants' continued use was the primary focus of attention. After the data had been analysed, the results showed that only five participants used the app continuously for seven days without interruption. Among the remaining participants, six people had a one-day interruption, and one person had two days interruption. For these participants, some interruptions were due to external factors such as illness, exams, studying, or busy work schedules. Others were interrupted due to negative experiences or a lack of motivation, choosing to pause usage on their own.

In addition, motivation data were mainly sourced from daily motivation scores recorded by users in their diaries. Due to the short duration of the experiment, the data do not show an overall trend. However, by comparing the diary entries, the results showed some details. When users encountered negative experiences, their motivation scores decreased for that day and the following day.

4.3 Encouragement Mechanisms

4.3.1 Streak

Streak has a bidirectional impact on users

In diary studies and interviews, nine out of twelve participants (75%) reported that streaks were the primary reason for their daily use of Duolingo. For some participants, maintaining a streak is not only a source of external motivation but also helps cultivate their learning habits. For example, P11 reflected, "The streak helped me develop a

habit and I have been learning continuously for a hundred and fifty-six days." On the other hand, some participants felt that the streak feature had a positive emotional impact on them. For instance, P8 stated, "I'm happy to keep the streak going."

However, streaks inspire users while also causing them psychological stress. Among the nine participants who previously reported a positive impact of the Streak feature, seven also indicated feeling stress, guilt, or superficial engagement due to maintaining their streak. For example, P4 said, "Maintaining a streak makes me feel stressed," while P5 pointed out, "When my streak is interrupted, I will feel guilty." P6 said, "I just go through the motions to maintain my streak."

A minority were unaffected.

Although the streak feature impacted most users, a few participants (two out of twelve) expressed a neutral attitude, indicating that their reasons for using the app were driven by personal goals rather than the influence of gamification mechanisms.

The impact of the freeze mechanism

Some users also discussed the "streak freeze" feature, which keeps users' streak records when they interrupt their usage for no more than two days. Some participants appreciated its flexibility, allowing them to continue their streak records even after an unintentional interruption. However, some users pointed out that this may weaken a sense of responsibility. For example, P10 said, "I know the streak will be frozen, so I want to take a day off."

Quantitative support from the survey

The quantitative data from the survey also demonstrated that the influence of streaks is bidirectional.

When asked whether they would complete at least one lesson daily to avoid interrupting their streak, twenty out of twenty-four participants (83.3%) agreed. Among these, eleven rated their agreement level as four, while the remaining nine rated it as five, indicating that the streak incentivized their daily learning behaviour (see Figure 1).

The second question revealed another aspect of this encouragement mechanism. When asked whether they would lose motivation to continue learning after the streak was

interrupted, tretton participants (54.1%) selected "somewhat agree" or "strongly agree," acknowledging that their motivation decreased significantly after the streak was broken (see Figure 2).

4.3.2 Leaderboard

Bidirectional impact of leaderboard

The leaderboard feature was mentioned less frequently than the streak feature. Only five out of twelve participants indicated that the leaderboard was an external motivator to varying degrees, either by stimulating emotions or promoting learning behaviour. For example, P3 stated that they would study more courses daily to maintain their ranking, and multiple participants expressed excitement about their high rankings.

However, at the same time, the adverse effects of the Leaderboard also impacted these people. Among those five participants, two reported that a decline in their ranking caused pressure and reduced their motivation. Moreover, it is worth noting that they had previously shown strong emotions toward the leaderboard feature, such as repeatedly mentioning their efforts to improve their ranking or citing the desire to climb the rankings as their primary reason for using the app. However, after their rankings declined, they experienced feelings of frustration or directly chose to stop using Duolingo for a day.

Also, a few users only had negative reactions to the rankings, such as "When my ranking dropped, the notification really hurt me." They did not mention the motivational effect. This shows that the feature might be a source of stress and not truly motivating for these users.

Quantitative support from the survey

The survey results indicate the limited and complex nature of the impact of rankings. When asked whether they would be willing to invest more time to maintain their rankings, only a small number of respondents indicated that they would. Approximately 60% of respondents (fifteen out of twenty-four) chose “Neutral” or “Disagree” (see Figure 5).

However, when asked if they felt pressure due to a decline in ranking, eight respondents took a neutral stance. In contrast, only six respondents said they felt pressure when their ranking declined. Another ten respondents said they felt little or no pressure when faced with a decline in ranking, indicating significant individual differences among users on this issue (see Figure 6).

4.3.3 Achievement system

Failure to attract attention

Since none of the twelve participants recorded any achievement-related entries in their diaries, the researchers collected participants' views on the achievement system through interviews. Ten participants stated that the achievement system did not catch their attention, and they did not even know how to obtain achievements. A few participants mentioned that the achievement system did not motivate them even though the icons looked attractive.

Additionally, two participants stated that they liked the achievement system because it allowed them to earn gems, but they did not obtain any new achievements during the experiment.

Quantitative support from the survey

The survey results indicate that over 60% of respondents said they would not be encouraged to learn more by Achievement or would be discouraged by failure to earn them. These quantitative data are consistent with qualitative observations that achievement systems are rarely identified as a core driver of user participation (see Figure 3 and Figure 4).

4.3.4 Random encouragement mechanism

In their diaries and interviews, participants also remarked that these randomly occurring incentives were good things. Since these functions are not used daily and each participant's experiences are different, it is impossible to collect consistent data or make quantitative comparisons of any kind for such mechanisms. However, it can still offer limited insights and possibly theory used. For an explanation of random features, please refer to "**Appendix 6:** Gamification Feature Technical Term Explanation".

Buddy System Enhances Responsibility and Engagement

The buddy system is a key motivator for many users; some participants said that having a learning buddy inspires mutual accountability and supports daily practice, while others remain motivated to learn and take more courses thanks to daily reminders from their buddies. In addition, all participants said that this feature works well, and no one mentioned any negative experiences.

Secret Treasure Boxes Bring Surprises

Many users have given positive feedback on the "Secret Treasure Box" task. This feature means that the system will randomly assign or place treasure chests along the learning path during the learning process. Users can unlock rewards after meeting specific conditions. The similarity of this feature to surprises and curiosities in real life seems to have a small stimulating effect; using this feature can reignite users' enthusiasm for learning and encourage them to persevere in completing tasks in order to obtain rewards, such as returning to the home page to view rewards after completing daily tasks.

Bidirectional impact of Daily Tasks and Double experience boost

It is worth noting that although a few participants mentioned double experience points and daily tasks, individual participants repeatedly mentioned these as having a bidirectional impact. For example, P1 repeatedly expressed a desire to learn more courses in order to complete the daily tasks they had received. However, P1 also mentioned that being unable to complete tasks made them feel pressured or anxious.

On the other hand, P8 stated that he enjoys using a double experience boost to increase his experience points quickly. However, he also mentioned that the inability to pause the double experience boost for an extended period makes him feel tired.

4.4 Penalty Mechanisms

4.4.1 Life points (Hearts)

Nine people (75%) among the twelve participants mentioned the life points mechanism in their diary entries or interviews. This feature has significantly impacted psychological and behavioural outcomes, with feedback covering motivation constraints and disengagement from trigger events.

Anxiety and avoidance behaviour

The emotional stress caused by life points is the most prominent theme. Many users reported that the risk of losing life points made them afraid to try when faced with problems or feel anxious when losing life points. Furthermore, some users recorded this multiple times, indicating that this impact may be ongoing.

Ceasing use due to depletion of life points

Duolingo offers multiple methods for users to restore life points after losing all of them. However, many users ceased their daily learning immediately after depleting their life points. A total of five participants indicated that they ended their learning due to insufficient life points. Two of them did not figure out how to restore life points. At the same time, the other two did not choose to restore life points despite knowing some methods, as they considered it a waste of time, such as doing very simple exercises and waiting or watching advertisements to restore life points. Another participant wanted to purchase hearts directly with gems to recover hearts quickly but found the price too expensive.

For these users, the life points system became a factor driving them to stop using the app, and the recovery feature has not successfully encouraged them to return.

Life points make it difficult for users to choose learning content freely

Multiple participants also mentioned that the limited life points made the placement test extremely challenging. In particular, they noted that they already had foundational knowledge of the learning content. However, the low tolerance for errors in the placement test forced them to continue with simpler courses. They all expressed impatience at being unable to pass the test and remaining in the basic course. Some of them explicitly pointed out that users with a foundation should be allowed more freedom.

Life points provide positive constraints

Only a tiny minority of participants considered life points to be a functional constraint. They believed the current restrictions encouraged them to answer questions more seriously and thus improved accuracy and created a positive incentive.

Quantitative support from the survey

Unlike the predominantly negative effects observed in diary entries and interviews, survey data indicates that the impact of life points is bidirectional. When asked whether this feature helped them answer questions more carefully, the vast majority of

respondents answered affirmatively. Specifically, 87% of participants (twenty-one people) selected “agree” or “strongly agree,” indicating strong user approval of this feature(see Figure 7). However, this perspective is rarely reflected in the diaries, with only a small number of participants acknowledging this view.

Additionally, 70% of respondents (seventeen people) reported feeling pressure, even stopping their learning after losing life points. These results align with the qualitative feedback in the diaries(see Figure 8).

4.4.2 Forced repetition

The frustration caused by repetition

The impact of forced repetition is primarily concentrated among individual users. Among the twelve participants, five participants (approximately 40%) mentioned forced repetition in their diaries or interviews. All of these participants expressed negative emotions toward this feature. Participants reported that repeating the same level after making a mistake often led to boredom and impatience. Some users further elaborated on the consequences of this frustration, mentioning that irritation led to more frequent mistakes.

Quantitative support from the survey

The survey results showed that, compared to the negative feedback commonly found in diaries and interview data, respondents' views on forced repetition were diverse. When asked whether forced repetition was seen as an opportunity for revision and learning, ten participants agreed with this view, while nine participants held the opposite view (see Figure 9).

The results of the second question aligned with those from the diaries and interviews. However, it is worth noting that respondents' reactions were more intense than those in the diaries: 70% of the twelve respondents believed that forced repetition made them feel stressed or impatient, with the majority selecting “strongly agree.” (see Figure 10).

4.5 Other Findings

During the experiment, participants also provided feedback except for the gamification of the app. Most of the feedback was negative. Some participants reported technical issues, such as being unable to use the voice input feature. Some participants

repeatedly pointed out grammatical errors or strange sentence structures in the questions, which made it difficult for some people to answer correctly. Some users said that Duolingo's advertisements were too frequent and users had to watch them after each chapter, which dampened their enthusiasm for learning.

However, a small number of users provided positive feedback, praising Duolingo's free language learning features. Additionally, some users believed that the simple exercises were well-suited for beginners.

4.6 Data Analysis

This section explains how to analyze the data presented earlier and aims to answer the two research questions of this study. The analysis method follows the content mentioned in the “Method” section. The data are classified according to gamification characteristics, and descriptive statistical analysis and inductive thematic coding are used to analyze the content related to these characteristics in the questionnaire, diary and interviews.

4.6.1 Addressing Research Question 1

Regarding encouragement mechanisms, we have analyzed and summarized the following themes.

The influence of streak is extensive and bidirectional

According to the study results, the streak is the most significant encouragement mechanism that affects users' daily participation behaviours, and its influence is evident and bidirectional. According to the survey data, most questionnaires, diaries, and interview participants indicated that Streak was their primary motivation for using Duolingo daily. Meanwhile, many of these people also reported the psychological stress or behavioural passivity brought about by Streak. These findings show that Streak has both positive and negative effects on users simultaneously.

Furthermore, the "streak freeze" mechanism also presents a dual nature. On the one hand, most users regard it as a flexible mechanism that helps them maintain streaks. On the other hand, some user feedback indicates that this feature reduces the binding force created by Streak.

The Leaderboard exhibits significant individual differences

According to the study findings, the impact of the leaderboard mechanism on users varies significantly from person to person. Based on survey data, the majority of respondents held neutral or negative attitudes toward the motivational effects of the leaderboard, believing it would not have a significant positive impact on them. Additionally, data regarding whether rankings cause stress showed high levels of dispersion.

However, for some users, the mechanism had a highly significant and bidirectional effect. Although only a small number of participants mentioned the ranking system in their diaries and interviews, they clearly expressed a strong desire to improve their rankings. They primarily rely on the positive emotions generated by improving or maintaining high rankings as motivation. Also, this group of people is more susceptible to the negative effects of leaderboards, and these effects cause them to experience more severe negative emotions. Some of them experience a noticeable decline in motivation due to a drop in their ranking, and even choose to stop using the app.

Achievement demonstrates "low activation"

Analysis shows that Achievement had a weak overall impact on user behaviour, with user feedback concentrated on three themes: "invisibility," "lack of purpose," and "lack of guidance." The feedback is consistent, indicating that most users were unable to identify or actively use this mechanism. Neither quantitative nor qualitative data revealed any impact on user engagement, demonstrating the "low activation" characteristic of this mechanism.

Random features demonstrate positive effects

First, feedback on the buddy system was concentrated and consistent. Although the number of mentions was limited, user feedback appeared repeatedly in multiple diary entries, indicating that the mechanism could consistently stimulate a sense of responsibility and sustained motivation to learn. The absence of negative feedback also indicated that users accept the feature well.

Second, although secret treasure boxes were mentioned less frequently than the Buddy system, all related comments were positive, demonstrating a light but pleasant motivational effect. Users expressed appreciation for the surprise element and

encouragement mechanism of this feature, indicating that it successfully stimulated participation at the experiential level.

Finally, the daily tasks and double experience points feature showed a clear two-way effect. Some users gained more motivation as a result, but at the same time, they expressed anxiety and fatigue due to their inability to complete these tasks.

4.6.2 Addressing Research Question 2

Regarding penalty mechanisms, we have analyzed and summarized the following themes:

Life Points create a more pronounced psychological burden on the user

By examining qualitative and quantitative data, the life point mechanism has a significant psychological impact on users. In diaries and interviews, most participants exhibited strong emotional responses. These emotions were primarily focused on themes such as anxiety, avoidance, and even learning interruption. Feedback indicated that some users immediately stopped using the application when their life points were depleted and did not attempt to recover them. Additionally, some users mentioned that the life point mechanism restricted their freedom to choose more advanced courses. This manifested itself in the testing phase as low tolerance for repeating simple content, thereby reducing the learning experience.

Nonetheless, there were users who believed that the mechanism motivated them to be more focused and to make fewer random guesses. This was rarely mentioned in the diaries and interviews, but the questionnaire data showed a high percentage of holders of this view, this suggests that there could be individual differences in the mechanism for the user group.

Forced repetition reduces user motivation

User feedback on the forced repetition feature in the diaries and interviews was dominated by negative sentiment. Of the five participants who mentioned the mechanism, all expressed dissatisfaction, boredom, or impatience, and some also mentioned more errors as a result of the mechanism. Qualitative data showed that this mechanism was perceived as interrupting the pace of learning and detracting from the learning experience. In contrast, the questionnaire data showed more polarized attitudes. About half of the respondents believed that repetition helped revision, while

the other half were opposed. It is worth noting that over 70% of respondents reported that forced repetition caused stress or irritation, and this response was more pronounced in the quantitative data than in the diaries. Overall, forced repetition generally failed to bring about the expected effects, but was instead perceived as a punishment by some users due to the lack of choice, affecting their willingness to use it and their motivation to learn.

5 Discussion

This chapter will explore and reflect upon the primary research questions that served as the study's compass. It evaluates the result in relation to the theoretical background and previous research. Furthermore, it examines the pros and cons of the method, explains the challenges encountered during the research process, and finds how these factors may have influenced the results.

5.1 Result Discussion

The collected data of survey responses, user diary entries and interviews with users provide valuable insights into how Duolingo's gamification mechanisms influence user engagement and motivation. In this section, each research question is examined in relation to the theoretical framework and previous research. This allows the study to better assess how various features help or hinder user experience in a digital language learning environment.

Research Question 1: In Duolingo, how do encouragement mechanisms such as streaks, achievements, and leaderboards affect users' engagement?

To answer this question, based on the findings, encouragement mechanisms have crucial impacts on user experience and boost engagement and motivation. However, there are still some problems that affect users negatively.

Streak

The results of this study show that streaks are one of the most effective gamification features to encourage daily use. Participants mostly showed that keeping a streak was a strong motivator for them to stay engaged with Duolingo. Together with the streak freezing function provides users with relieved feelings by allowing users to have a short break without losing their streaks. It made them more flexible to maintain their streaks, yet for some participants, the features could negatively affect their sense of responsibility. This finding aligns with Self-Determination Theory (SDT), specifically the necessity for users to receive satisfaction from meeting daily learning goals and experiencing real progress. On the other hand, it also reflects the Octalysis Framework's Core Drive of "Development & Accomplishment". However, while streaks initially motivated users, they might have caused psychological stress. Several participants reported emotions of tension, guilt, or performing tasks while having to maintain their streak. Some users admitted that they only complete a lesson just to

maintain the streaks rather than actually learn, and sometimes it makes them feel tired and lose motivation. This aligns with SDT, which shows that while extrinsic rewards such as streaks can help gain engagement, the experience might become a burden and undermine intrinsic interest and negatively affect the autonomy of an application. As claimed by Mekler et al. (2013), while streaks effectively increase short-term engagement, they may hinder long-term intrinsic motivation if users feel forced rather than motivated.

Leaderboard

Secondly, the leaderboard feature also had a mixed influence on participants in the experiment. Some participants had positive feelings for the feature. For instance, some users thought the rankings system gave them an exciting feeling of competition and motivated them to put more effort into learning and improving their position. This is related to the "Social Influence and Relatedness" Core Drive, which supports the idea that social recognition and comparison can encourage users by giving them the sense of being appreciated, leading to an increase in motivation and engagement. However, the feature sometimes leads to negative emotional effects. Some participants who experienced a drop in rankings often showed feelings of disappointment and pressure. It decreased their motivation and even led to disengagement from the app in a few days. The leaderboard affects the user in both ways, it can enhance engagement, but also cause negative emotions and pressure. According to both the Core Drive “Social Influence and Relatedness” and SDT, while social mechanisms can enhance engagement, they can also undermine autonomy and intrinsic motivation when users have feelings of external pressure or failure. The rankings can inspire users but also can discourage them when the comparison becomes demotivating.

Achievement

The collected data show that the achievement system remarkably failed to influence user engagement. Only a few participants in the diary like the feature of being able to get more gems. Most participants either ignored the achievements or did not notice them. According to Nielsen’s Usability Heuristics, good user interface design should provide good visibility of system status and recognition rather than make users remember. This is considered one of the main problems of this feature during the experiment. The lack of clear feedback or visibility of the feature contributed to its failure in influencing users. That makes users find fewer reasons to pay attention to achievements.

Other subtle features

Meanwhile, some subtle features such as the friend system and treasure boxes had a positive impact during the diary research. Some participants mentioned that the friend system had a positive effect on them in completing lessons. It encouraged participants by showing a sense of social responsibility. This relates to the SDT's need for Relatedness when users feel more related and connected with other people in the same field which leads to increase in motivation and engagement. Besides, the treasure boxes also had a good impact on users in the diary research. This can be explained by the Core Drive of "Unpredictability & Curiosity" in the Octalysis Framework. Treasure boxes can bring curiosity to users making them more excited to keep studying language with Duolingo. Unlike streaks or leaderboards, these features tended to maintain positive emotions without introducing significant pressure, making the app more playful and highly effective in sustaining user engagement.

Moreover, daily tasks provide small and achievable goals, which is supported by the Octalysis drive of Development & Accomplishment, giving users the feeling of making progress. However, it can also lead to similar effects of streaks that are pressure and anxiety when users are unable to finish all of the tasks. This also reflects the SDT's caution that sometimes external goals can undermine intrinsic motivation if they become controlling and burdensome. Finally, the double XP (experience points) boost feature which allows users to earn double XP. The feature also has some mixed reactions from the participants. Some feel appreciated by the efficiency it provides and often use it as an opportunity to increase their ranks, yet the feature has a limited time to boost XP. Some users reported that they cannot pause the timer for the boost and feel their benefits are negatively affected. This reflects the core drive of "Scarcity & Impatience" which is sometimes the limited-time rewards can make users feel frustrated and lead to a sense of loss. Opposite to the other two features above, the results showed how lightweight, optional gamification like daily tasks and double XP boost can have bidirectional effects on user motivation and engagement.

Conclusion

The results show that these features can remarkably increase user motivation and engagement. For example, streaks can support users' motivation by making them feel proud of maintaining a learning record, but can also stress users out making them feel forced to maintain streaks every day. The streak freeze feature can also reduce stress by offering users a break, yet for some others the feature can cause motivation to drop since they no longer feel challenged. Moreover, the leaderboard boosts users by giving them a competitive environment, but it can also lead to an overwhelming feeling when their ranking drops. On the other hand, the achievement feature was often underused

because of the lack of visibility and feedback, even though it has a potential impact on users. Some subtle features like daily tasks and double XP boost also got some mixed reactions from users; they can influence user experience but the limited time in both features makes users exhausted, even though they are optional. Meanwhile, some other features like friend tasks and treasure boxes offered positive reinforcement without pressure, making them more effective for users. In conclusion, Duolingo's encouragement mechanisms are important in driving user engagement by helping users have a sense of progress, accomplishment and connection, yet their effects are not always positive and can lead to some negative influence on users.

Research Question 2: How do failure penalty mechanisms in Duolingo, such as running out of hearts or forced repetition, affect users' motivation?

The penalty mechanisms analyzed in this study like life points and forced repetition have a remarkable influence on user experience.

Life point limitation

The life points system in Duolingo is designed to encourage accuracy for users. In the survey, the results show that a majority of users agreed that the heart system made them more careful and focused during learning sessions. However, diary entries and interviews revealed a deeper pattern. Even though there were some participants who saw the positive side of the feature and agreed that life points made them anxious, many participants experienced anxiety and a loss of flexible learning when faced with the possibility of losing hearts. Some users also mentioned that they found the process to regain hearts discouraging and viewed it as a waste of time rather than an opportunity to learn more. This pressure often led users to cut their sessions short or even quit their learning progress immediately when their hearts were all lost. For them, the heart system created an environment of anxiety rather than a space for learning. That is directly against SDT's emphasis on autonomy and competence. That causes a negative influence on user motivation. These results align with findings from the previous research by Koivisto & Hamari (2019) which shows that poorly designed motivational systems can lead to cognitive overload.

Moreover, participants reported that the ways to regain life points like waiting, watching ads, or completing easy tasks felt exhausted and disconnected from the learning experience. Some participants mentioned that the advertisement affects their experience while studying in Duolingo negatively, not only in regaining their hearts but also after every lesson, they felt the system was too frequent that interrupted their

learning sessions. The difficulty of restoring life points without interruption discouraged user motivation and engagement.

Forced repetition

Similarly, the forced repetition is created to help users review and correct their mistakes. However, based on the data most of the participants saw the feature as a source of frustration, boredom and decreased motivation. Many participants reported that the feature made them impatient and even made users more frustrated and caused more mistakes. Although repetition has educational benefits, users being forced to repeat lessons without the option to skip was viewed as punitive rather than supportive. There are some users who liked the opportunity to revise, but the majority found it difficult and disappointing, especially when faults were minor or caused by app errors (such as grammar problems in exercises or mistranslations). This again reflects a violation of Nielsen's Usability Heuristics of User Control and Freedom where users should have options to undo actions and avoid penalties for small errors.

Conclusion

These results point out that while some level of difficulty is required to maintain learning progress, some punishments can decrease autonomy or set up a feeling of stress leading to a decrease in user motivation and experience. Gamification systems, especially in learning environments like Duolingo, have to encourage rather than prevent users' intrinsic motivation to learn. In summary, even though penalty mechanisms were created to encourage better learning behaviour, they could have the opposite effect causing anxiety, boredom, and disengagement. Gamified learning systems should prioritize flexible, supportive feedback in order to increase user motivation.

5.2 Method Discussion

This section evaluates the methodology employed in the study, including its strengths and limitations, the efficacy of solving research questions, challenges faced during the research process, and overall reliability and validity of the outcomes.

Strengths and Limitations of the Methods

The first strength of these utilized methods is the combination of 3 techniques, which are surveys, user diaries and semi-structured interviews. This mixed-methods approach includes both qualitative and quantitative techniques. This allowed the experiment to collect multiple sources that can be compared to each other and make the data more valid. Each technique brought different benefits to the experiment. The survey could collect a wide amount of data from the Duolingo user base, the diary study can document users' daily experiences and real-time emotional responses, and the interviews offer deeper reflections that can provide more understanding of users' insights and behaviours.

Moreover, using a user diary study and then interviewing participants after the study, allows users to reflect on their own learning experiences every day. Participants could be in their natural learning environments which helped collect data of real experiences and reactions from users, and increased the credibility and relevance of the results.

However, some limitations were found during the execution. Firstly, the sampling method used for the experiment was convenience sampling. The participants were selected based on their availability and willingness to take part in the study. Even though it made the experiment easier to collect the data in a limited timeframe, it also meant that the results might not fully reflect Duolingo's wide user base.

Secondly, the sample size for the diary study and interviews is small, twenty-four participants for the survey and twelve participants for the user diary. Also, the executed period of the study was short, only seven days, which could restrict the ability to observe longer-term engagement of users, such as how motivation may evolve over several months of app usage.

Furthermore, the diary entries could lead to the risk of having biases which is hard to avoid since the user diary study mostly relies on self-reporting. The quality and length also have differences in the diary entries from different participants. Some participants provided very detailed insights while others provided shorter, less insightful responses.

Finally, this study only focuses on gamification systems and their impact on user motivation and engagement in Duolingo. The results in this study cannot represent all and show all the results of the influence of gamification on other language learning applications.

Despite these challenges, the mixed-methods approach can provide comprehensive and reliable insights into user experiences, motivation and engagement in Duolingo within the limited research timeframe.

Execution and Achievement

The methodological execution helped to meet the study's goals. Firstly, the trends within Duolingo users were collected through the survey, which gave the initial insight into the current trends of Duolingo users' feelings, engagement and motivation.

Secondly, the user diary research effectively gathered information on the users' daily emotional and motivational changes in Duolingo, which offered clear insights into how different features of gamification in Duolingo impacted user experiences, motivation and engagement.

Moreover, the users' diary usage experiences and feelings helped connect their behavioural patterns together. For example, the decrease in usage after losing life points or the increase in user engagement to maintain daily streaks.

Lastly, the semi-structured interviews enhanced the data in the user diary by allowing participants to reflect more deeply on their diary experiences during the week. With this method, some underlying causes of observed behaviours could be found out and collected through these interviews, such as why some participants replied positively to competition while others became nervous and gave up.

By combining the results of the user diaries, semi-structured interviews and surveys, the research method can effectively answer the two research questions about the influence of encouragement mechanisms and penalty mechanisms on user engagement and motivation.

Challenges and Improvements

The first and perhaps a major challenge was maintaining the participants' consistency with the diary for seven days. Most of the participants provided daily entries but some of them gave a few missing or minimal entries on certain days, even though the participants had daily reminders. That affected the quality and quantity of the information collected for the research, reducing the scope of a bigger and clearer view of user experiences and motivation. This kind of problem is not easy to deal with since it mostly relies on participants' willingness and external issues. Yet, having a couple of days off was not completely negative because the diary could clearly show what participants' actual thoughts and feelings were which can somehow benefit the study.

Another challenge was a short timeframe for the study execution. The limitation of time reduces the ability to observe and study long-term motivation and engagement of Duolingo users. The participants' reactions to the gamified features can be different

over a long period. So, to address these issues, to have more time and extend the user diary study longer like weeks and months, would be a better amount of time for examining how novelty effects grow and change into users' behaviours.

Finally, as mentioned in the limitations, self-report methods can lead to biased results. In the diary report form, even though there were a few Likert scale questions to minimize the biases yet they could not avoid most biases. In future studies, it can be considered to have short meetings every day with participants, so more objective insight can be collected and reduce biases from participants.

Validity and Reliability

Firstly, the validity and reliability of this study were enhanced by using the multi-method approach. That included survey responses, diary entries and interviews. The study can collect data from different insights and reduce the biases from participants, which also made it easy to form clear perceptions of users' experience and behavior towards Duolingo. Also, the results collected from three different methods also supported each other and gave a better understanding of user motivation and engagement in Duolingo.

Besides, the study was also supported by using three theoretical frameworks: Nielsen's Usability Heuristics, Self-Determination Theory (SDT) and Octalysis Framework. These principles of usability and motivational aspects support the analysis of the study and improve its validity and reliability.

Finally, the data collected from the methodology was also documented through thematic analysis which increased accessibility and made it easier to understand and replicate.

However, some problems were found in qualitative research because of the biases, which means some variability cannot be avoided. In future research, larger and more diverse samples can be included, user diary research can be more standardized and perhaps allow participants to have an opportunity to review and verify their interview transcripts and diary answers to improve the accuracy and authenticity.

In conclusion, even though the methodology in this study has some limitations, it still recorded good and various insights into user experiences with the impact of Duolingo's gamification on user motivation and engagement in order to answer the research questions.

6 Conclusions and further research

6.1 Conclusions

The research investigated how the gamification elements in Duolingo influence user motivation and participation, particularly through both encouragement and penalty mechanisms. Although these designs were designed to enhance the user experience, the study revealed a key issue: while gamification elements provide a better user experience, they also have the potential to diminish engagement and motivation, and even cause users to stop using them.

Research Question 1

According to data from the study, Duolingo's encouragement mechanism motivates users to learn and imposes an emotional cost on them. The streak is the main driver for daily logins, helping to cultivate habits and enhance a sense of progress, but it also creates pressure to "check in" simply to maintain the record. The streak freeze reduces user pressure but also leads to complacency. The leaderboards motivate competitive learners to practice more, but falling in the rankings can lead to frustration. However, achievements were barely used; some users even reported that they did not notice or fully understand how to interact with it, and the feature's lack of clear feedback and visibility could weaken its potential. On the other hand, some features enhance user engagement without increasing pressure, such as friend tasks and treasure chests, which help sustain long-term usage. Moreover, some features like daily tasks and double XP boost had mixed reactions from users; some felt they could be more productive and motivated because of these features, yet others felt they brought pressure due to the time constraints or the need to finish all the tasks. In summary, encouragement mechanisms can enhance user engagement, but their effectiveness varies.

Research Question 2

Life points and forced repetition as penalty mechanics are associated with short-term motivation decline. Most participants paused practice when their life points were depleted and became bored with repeating incorrect questions.

Although these penalty mechanics protect accuracy, they also cause anxiety and frustration, which may produce the opposite of the intended effect. Therefore,

designers should focus on giving users more flexibility and encouragement to stimulate their autonomy rather than relying on punishment.

6.1.1 Practical Implications

This study primarily uses Duolingo as an example to analyze the complex impact of gamification mechanisms on learning motivation and participation. The findings can serve as a case study to provide direct guidance for the functional iteration of educational technology applications, particularly for development teams planning to integrate gamification into their software. The experimental data and thematic code from this paper can be quickly reused to help them improve efficiency, shorten product iteration cycles, reduce trial-and-error costs, and achieve the objectives of enhancing application user experience, stimulating user motivation, and reducing user anxiety.

6.1.2 Scientific Implications

From the scientific side, the research provides empirical evidence of how gamification influences the users' motivation and engagement. The study adopted a combination of methods which contain surveys, diary studies, semi-structured interviews. This research validated the Self-Determination Theory (SDT) and the Octalysis Framework in studying mobile applications.

Finally, this research enriches interdisciplinary fields such as digital education, motivation design, and human-computer interaction (HCI). The theoretical insights and empirical data it provides can support future research on data-driven personalized learning optimization and more effective gamification strategies in the educational context.

6.2 Further Research

According to the limitations of the research, some more directions for the future are listed:

1. Long-term studies.: The research only lasted for a week. In order to better understand the influence of the gamification design in the long term, the research should be extended (e.g., several months or a year), to see whether the users' motivation and sense of novelty will change over time.
2. Comparison research through different applications: Because the research only focuses on Duolingo, further research can compare different types of language

learning applications (e.g., the Tomato app and the Memrise app) and explore which features work the best and the differences in the gamification design.

3. User Segmentation Analysis: The future analysis can focus on different user segments (e.g., by age, sex, motivation, or the purpose of studying) to analyze the different reactions to gamification.
4. Mechanism tests: Based on user feedback, the streaks, rankings, and punishment mechanisms can be modified or adjusted (e.g., the levels can be adjusted, punishments can be chosen, etc.).
5. Increasing encouragement mechanisms: People are more likely to continue using language learning applications with more praise or rewards. Too many punishments may reduce users' enthusiasm.

To summarise, gamification can potentially improve the users' motivation and participation. However, the design should be careful to prevent or reduce the adverse effect on intrinsic motivation. Based on this, further research can continue improving the game mechanism, making it a more pleasant, efficient learning experience.

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8 Appendixes

Appendix 1 Survey questionnaire template

1. User background

-Are you a Duolingo paid member?

○ Yes

○ No

-How frequently do you use Duolingo?

○ A. Daily

○ B. 3–4 times per week

○ C. A few times a week

○ D. Realy or no longer use it

-How long have you been using Duolingo?

○ A. Less than 1 month

○ B. 1–3 months

○ C. 3–6 months

○ D. 6–12 months

○ E. Over 1 year

-How long do you use Duolingo each day on average?

○ A. Under 15 min

○ B. 15–30 min

○ C. 30–60 min

○ D. Over 60 minutes

2. Likert scale

1=Strongly disagree / 5 =Strongly agree

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

Streaks

1. I will stick to completing at least one unit per day to avoid breaking the streak.

2. When Streak is cleared, I lose the motivation to continue learning

Achievements

1. I often study extra to unlock achievements

2. Missing or not achieving will make me depressed

Leaderboards

1. I will put in more time studying to improve or maintain my ranking on the leaderboard

2. I feel pressure when I notice a drop in my ranking position.

Life points

1. When there are limited health points, I can answer more carefully and attentively..

2. Losing health points makes me feel stressed and sometimes it is better to stop studying than to use methods (waiting/paying/doing exercises) to resume.

Forced repetition

1. When I have to repeat a level, I see it as an opportunity to revise and learn

2. I feel stressed and impatient when I repeat the same level multiple times

(Optional)

If you want to continue to participate in the study, please leave your contact information.

Appendix 2 Diary template

Email

1. Date
2. What day of the streak is this?
3. How much time did you spend on Duolingo today?
4. How many lessons did you complete today?
5. How did you feel overall after using the app today? (5-point Likert scale)
6. How motivated were you to use Duolingo today? (5-point Likert scale)
7. What is your motivation or reason to use Duolingo today?
8. Subjective opinion
9. Anything else? (Optional)

Appendix 3 General Questions list (for all participants)

What do you remember as the most pleasant and the least pleasant parts of the experience?

Besides from what you mentioned in the diary, if there is another reason why you have the motivation or willingness of using the application everyday?

Imagine if Duolingo removed these incentives and penalties, how would your usage frequency or habits change?

You never mentioned anything about achievement acquisition in your diary. Is it useless for you ?

Appendix 4 Personalised Questions list (for specific participants)

P1

I found that you have strong intrinsic motivation and your own learning rhythm, but does the gamification mechanism affect your motivation and participation?

What is the impact of the HP limitation on you?

P2

You mentioned that you don't care much about these gamification features and are hardly affected by them. Can you explain the motivation for your daily use?

It seems like you're finding it too difficult to skip levels. Could you explain why?

P3

You seem to care a lot about ranking and streak and have a very clear learning goal. Could you elaborate on why that is?

You mentioned that you were not in good condition for a few days. Does Duo's mechanism put more pressure on you?

You seem to have a negative attitude towards the restrictions on skipping chapters and HP restrictions. Can you talk about the reasons in more detail?

P4

Can you explain in more detail how you felt when you found that your streak was frozen instead of reset? What impact did this have on you?

You mentioned that the punishment mechanism increased your negative emotions. Can you please talk about your specific feelings and the impact caused?

P5

How do you feel when you see your streak frozen?

You mentioned that "not clocking in yesterday makes it harder to get into the zone today." Do you think there's anything the game system can do to help you "get back into rhythm"?

You mentioned Limited-time treasure chests.Can you talk specifically about how this feature affects you?

P6

Will you feel pressured about keeping the streak every day after your high-pressure work?

When tired, do you still spend 5 minutes learning just to avoid breaking the streak?

How does making repeated mistakes and losing life points affect you?

Can you talk about how you felt in the days after the streak was interrupted?

P7

You mentioned that you feel happy and curious when you see the Duolingo icon light up or change. How much does this change affect your motivation to open the App and learn every day?

If Duolingo removed such limited-time rewards, would you still study every day?‘

Are there other gamification elements that motivate you?

P8

You mentioned you wanted to catch up with your friends during the first day, Is it the reason you are motivated?

You usually study for more than 30 mins, but there are some days when you study for a very short time. Can you talk about the reasons for this? Did you encounter any special situations?

P9

On the 2nd day, the amount of time you used Duolingo immediately increased to 20 minutes. What was the motivation that made you study that long that day? And what made you stop spending more time using the app after that day?

You skipped a day because of studying and did not have time, what are your thoughts and feelings?

You said the main reason you use Duolingo is to maintain the streaks and you did sometimes check your ranking, did these affect you positively or negatively?

P10

How do you feel after a long time of stopping using Duolingo and then going back to using it in a week? Will you keep using the app after this?

You seem like don’t have much passion for using the app, do you have specific reasons?

One of the reasons that makes you irritated is the ads after a lesson. Was it the things that made you lose interest after a long time using the app?

As you mentioned, because you don’t have much time to use Duolingo and skipped a day, what are your general thoughts and feelings on that day?

You seem to care about the achievement somehow, is it considered for you as motivation to use the app?

P11

As we know, you want to keep your hobby of using Duolingo as your daily routine, how do you feel when you need to maintain your streak every day and does it help you to study?

You seem like you don't use other features like do not usually check your ranking, do you have specific reasons for that? And will you consider using more features in the future?

Is the app for you qualified as a language learning app or just a game for you?

P12

You seem quite active like checking your ranking and using friend tasks, how do you feel about those features? Do you think it is one of the reasons that keeps you using the app?

You did mention the limitations of the heart, what do you think if you lose all of the hearts and what will you deal with that?

You skipped a day because you lost the passion for doing the ranking, can you talk more about it? In general, do you think the leaderboard feature makes you more willing to use the app or stresses you out?

Appendix 5　Interview record（P1-P12）

P1

Researcher: Can you describe the most pleasant and unpleasant parts of using Duolingo?

P1: What impressed me mainly was the interface of duolingo. It was very attractive. What frustrates me is that duolingo seems to like to push some tasks to force me to learn more every day. However, due to work, my time is limited each day. I prefer to keep my own pace to learn. Besides, I don't like its restrictions on skipping levels. The error tolerance rate of the skipping test is a bit low.

Researcher: Besides what you mentioned in your diary, are there any other reasons that motivate you to use this application every day?

P1: That is my main reason for using this app. I am basically self-taught and want to maintain a daily learning routine without interruption.

Researcher: I notice that you have strong intrinsic motivation and your own learning pace, but do gamification mechanisms further influence your motivation?

P1: I think so. For example, some daily tasks motivate me to learn to a certain extent and keep me studying every day. However, they also put pressure on me. For example, when I have completed my daily study but receive a reminder that my ranking has dropped, it makes me anxious. But I don't have extra time to use Duolingo, which makes me feel pressured. In addition, as I mentioned before, I have my own plans and don't like being forced to do things.

Researcher: Could you talk about how the life point limit affects you?

P1: I think it's more about pressure. For example, when I skipped a level, I only had three chances.

Researcher: What would you do if you ran out of lives?

P1: I would just stop playing for the day.

Researcher: Have you found any ways to restore your lives, or have you tried any methods?

P1: No, I haven't discovered those features. I thought you had to wait a certain amount of time for them to reset.

Researcher: Could you talk about how the achievement system has affected you, or your thoughts on this feature?

P1: First, I would like to say that I didn't pay much attention to achievements. Second, during that time, I didn't notice how to earn achievements or track progress. It seems like they aren't very noticeable.

Researcher: For the last question, imagine if Duolingo were to remove these mechanisms. How would your usage frequency or habits change?

P1: I think I would probably continue using it. The disappearance of some features would give me more autonomy in controlling my learning progress, but I might miss a day of studying because I wasn't reminded by the Streak feature.

P2

Researcher: Can you describe the most pleasant and unpleasant parts of using Duolingo?

P2: Nothing particularly surprised me, but things like ads, life limits, and strange grammar issues made me feel frustrated while using it.

Researcher: Besides what you mentioned in your diary, are there any other reasons that motivate you to use this application every day?

P2: In addition to those reasons, one other important reason is that I had enough free time that day. I probably wouldn't have set aside a specific time to use Duolingo. I usually use it while waiting for the bus or waiting for someone.

Researcher: You mentioned that you don't really care about these gamified features and that they have little effect on you. Could you explain your motivation for using the app on a daily basis?

P2: I don't have a specific purpose for using the app. I'm just using it to learn during my spare time. For me, the motivation comes more from the novelty of it, as I'm a new user and want to try out some of Duolingo's features.

Researcher: It seems like you're feeling that the levels are too difficult to skip. Could you explain why?

P2: I think there are two main reasons for this. First, the life limit. As a free user, I only have three chances to make mistakes when skipping levels. The other reason is that some of the questions are strange, making it easier to make mistakes.

Researcher: Could you talk about how the life limit affects you?

P2: I think it has a significant impact on me. It often prevents me from learning because I already have a certain foundation in Italian. I would prefer to have more freedom to choose chapters rather than having to pass a difficult test to proceed to new chapters. I've tried leveling up multiple times, and if I hadn't succeeded on the last attempt, I might have given up on using Duolingo altogether.

P3

Researcher: Can you describe the most pleasant and unpleasant parts of using Duolingo?

P3: I would say the overall experience is pretty good. Some features effectively motivate me to study daily, and maintaining a streak and ranking keeps me excited. However, forced repetition is the part I dislike the most because sometimes I need time to review instead of just mechanically repeating my mistakes in a chapter.

Researcher: Besides what you mentioned in your diary, are there any other reasons that motivate you to use Duolingo every day?

P3: Other than that, I hope to improve my Swedish through learning.

Researcher: You seem to place a lot of importance on rankings and streaks, and your learning goals are very clear. Could you elaborate on why that is?

P3: I have a plan for my learning. I hope to use Duo to improve my language skills over a period of time. At the same time, I also really enjoy the sense of achievement that comes with high rankings and streaks. This motivates me and increases my willingness to use the app.

Researcher: You mentioned that you were feeling unwell for a few days. Did the gamification mechanics put more pressure on you?

P3: Yes, those days Duolingo put more pressure on me. I didn't have enough time to use it, but I wanted to maintain my ranking and streak, so I chose to complete some very simple practice chapters just to keep the streak going. Afterward, I felt regret because it lost the original meaning of learning—it was about learning, not just

breaking a record on Duolingo. But I didn't want to lose the streak, which made me feel conflicted.

Researcher: You seem to have mentioned that you have a negative attitude toward restrictions on skipping level tests and life points. Could you elaborate on why?

P3: Regarding the level-skipping test, I feel that it has a low tolerance for mistakes. People are bound to make mistakes. I am already a paying member, and five chances are not enough for me. I can't imagine how free users would use it on a daily basis.

Researcher: Could you talk about how the achievement system has affected you, or your thoughts on this feature?

P3: I haven't paid much attention to achieving milestones recently, but I did earn some during my previous usage. However, overall, they seem rather unremarkable compared to features like leaderboards and streaks, which motivate me.

Researcher: Can you imagine if Duolingo were to remove these mechanisms? How would your usage frequency or habits change?

P3: There might be some changes. I probably wouldn't obsess over rankings or streaks anymore, but I'd still follow my study plan and keep using Duolingo.

P4

Researcher: Can you describe the most pleasant and unpleasant parts of using Duolingo?

P4: Duolingo makes me feel like I'm playing a game rather than using a boring learning software. Some of its mechanisms are very effective in encouraging me to learn, because I don't have much motivation on my own, but I still want to learn a new language. The streak feature reminds me to study every day. I especially want to mention that the freeze feature is really good, as it prevents my streak record from being reset. However, this also puts pressure on me during that period. For example, as my streak increases, I feel more pressure to maintain it.

Researcher: Could you talk about your motivation for using Duolingo?

P4: I mainly want to learn new languages, but traditional learning methods are too boring for me. Duolingo makes it more interesting, and I think that's my main motivation for using it.

Researcher: Are there any other reasons or motivation that drive you to use the app daily?

P4: No, I don't think so. My reasons are basically those I mentioned earlier, such as being reminded to study or seeing the Duo mascot turn red.

Researcher: Could you explain in more detail how you felt when you discovered that your streak had been frozen rather than reset? How did this affect you?

P4: Before I realized it had been frozen, I felt very negative and almost didn't want to continue. The sense of failure from having my streak reset was very strong, especially after maintaining it for a while. However, when I was notified that day, I discovered my streak had been frozen instead of reset. This greatly boosted my motivation, making me want to immediately continue with that day's lessons to maintain the streak. I had been using Duolingo before this, but that feature wasn't available at the time. I paused using it because I lost my streak record.

Researcher: You mentioned that the punishment mechanism has increased your negative emotions. Could you elaborate on your specific feelings and the impact it has had?

P4: Regarding the life limit, sometimes consecutive mistakes cause me to lose all my health points immediately, which makes me feel a lot of pressure while using it. Additionally, after running out of health, I feel very regretful.

Researcher: Have you tried to restore it?

P4: Yes, I have tried, but restoring health requires too many gems, and I don't have enough gems.

Researcher: Could you talk about how the achievement system has affected you, or your thoughts on this feature?

P4: Personally, I really enjoy achievements. In my previous use, I remember earning some achievements that could be exchanged for gems, but I haven't earned any new achievements recently.

Researcher: Can you imagine if Duolingo were to remove these mechanisms? How would your usage frequency or habits change?

P4: I don't think I'll continue using it. I used Duolingo because its mechanisms motivated me to learn. Without them, Duolingo is just a boring piece of software to me.

P5

Researcher: What do you remember as the most pleasant and the least pleasant parts of the experience?

P5: For me, the happiest part is interacting with friends. I can check their status and compete with them. Of course, there are also some parts I don't like as much. I think the heart icon is really annoying. Every time I use Duolingo, I worry about making mistakes, and if I need to restore my health points, I have to watch ads.

Researcher: Besides the reasons you mentioned in your diary, are there any other reasons that motivate you or make you want to use this app every day?

P5: Ah, you actually reminded me of another point. The social aspect of Duolingo and interacting with my friends also motivates me.

Researcher: Could you talk about how the achievement system has affected you, or your thoughts on this feature?

P5: I haven't paid much attention to this feature. Maybe it's because I haven't learned enough yet.

Researcher: How do you feel when you see your streak frozen?

P5: I feel conflicted: on one hand, I think, “Finally, I'm free from the pressure of checking in every day,” but on the other hand, I feel a little guilty for not studying today. However, this guilt doesn't last long because I quickly comfort myself: “Since the freeze allows a two-day break, I might as well take another day off.”

Researcher: You mentioned treasure chests. Can you talk specifically about how this feature affects you?

P5: In the short term, it's definitely helpful! For example, when I see these tasks, I immediately go into sprint mode. But this efficiency is “short-lived.” Once the countdown ends, my attention often drifts again. Sometimes, to save time, I even skip the pronunciation practice and go straight to the multiple-choice questions, which actually lowers the quality of my learning. However, overall, this design makes me more willing to open the app—after all, who doesn't want to take advantage of the system's benefits?

Researcher: You mentioned that “not checking in yesterday makes it harder to get into the zone today.” What do you think the game system could do to help you “get back on track”?

P5: If there were a special return package for users who missed a check-in, such as giving them some rewards, that would be great.

Researcher: Imagine if Duolingo removed these incentive and punishment mechanisms—how would your usage frequency or habits change?

P5: I think I might start using it less frequently because it feels boring, and without the motivation from friends or a winning streak, I find it hard to stick with it.

P6

Researcher: What do you remember as the most pleasant and the least pleasant parts of the experience?

P6: The most enjoyable part is seeing my daily streak increase. This gives me a sense of accomplishment. However, it also frustrates me because I am very busy every day, yet I have to carve out time to use Duolingo to maintain my streak, which adds pressure.

Researcher: Besides the reasons you mentioned in your diary, are there any other reasons that motivate you or make you want to use this app every day?

P6: The streak is my main reason. The rest might be that Duolingo looks more like a game, making learning less boring than just reading a book.

Researcher: Will you feel pressured about keeping the streak every day after your high-pressure work?

P6: Yes, it is definitely stressful. Work consumes most of my energy. I don't want to break the streak, but I can't muster the energy to keep going. When I'm most exhausted, I even think, “Would it be better not to do it today?”

Researcher: When tired, do you still spend 5 minutes learning just to avoid breaking the streak?

P6: Sometimes, yes. Even if it’s just mechanically opening the app and randomly completing a task, I still want to see that number go up. But occasionally, those five minutes become a brief escape—doing something unrelated to work in the middle of a hectic day, even just simple exercises, gives me a short breather.

Researcher: How does making repeated mistakes and losing life points affect you?

P6: Making mistakes itself isn't a big deal, but the heart-loss system makes them feel especially glaring, like a constant reminder: "You failed again." If I'm already in a bad state, repeated failures just make me more frustrated—I might even give up on that day's tasks. It's not that I don't want to learn; I just don't want to be reminded that I messed up when I'm already feeling tired.

Researcher: Can you talk about how you felt in the days after the streak was interrupted?

P6: I was quite dependent on the streak to motivate me to study. But seeing that the streak record was frozen instead of being reset after the interruption, I always wanted to take a break again, but I also wanted to continue using it to maintain the streak, which made me very conflicted.

Researcher: Could you talk about how the achievement system has affected you, or your thoughts on this feature?

P6: Sorry, I haven't paid much attention to this feature.

Researcher: Imagine if Duolingo removed these incentive and punishment mechanisms—how would your usage frequency or habits change?

P6: I think I might only use it when I remember, rather than every day, because I wouldn't take the time to study just to maintain a streak.

P7

Researcher: What do you remember as the most pleasant and the least pleasant parts of the experience?

P7: Well, for me, the most enjoyable part is definitely the speaking practice on Duolingo. Even if my pronunciation isn't perfect, the system encourages me, which gives me more confidence to do more speaking practice. The least enjoyable part is definitely spelling words. I don't want to spend too much time trying to remember the exact spelling of every word. I think Duolingo could give users some options to choose their preferred assessment method, so that everyone can get the results they want.

Researcher: Besides from what you mentioned in the diary, if there is another reason why you have the motivation or willingness of using the application everyday?

P7: I actually have nothing more to mention. Studying in Duolingo is kind of a daily routine for me now before I go to sleep. I don't have a very specific purpose or goals about what I am going to achieve. I just think that after days and years, my language skills will absolutely be improved or just remind me to at least prevent forgetting everything.

Researcher: Could you talk about how the achievement system has affected you, or your thoughts on this feature?

P7: Oh, I haven't heard about that before. I don't even know what requirements I need to meet to get an achievement.

Researcher: You mentioned that you feel happy and curious when you see the Duolingo icon light up or change. How much does this change affect your motivation to open the App and learn every day?

P7: The small changes in the Duolingo app, such as the icon lighting up or changing, positively affect my motivation to learn. The changes motivate me to open the app and engage in learning. I'm curious to see how the icon changes, which creates a sense of interaction for me. I find that the more I interact with the app, the more I want to continue learning. Every time I open the app to study, seeing the icon change feels like witnessing my progress. This sense of interactivity encourages me to use the app daily and actively participate in learning.

Researcher: If Duolingo removed such limited-time rewards, would you still study every day?

P7: I will continue to study as I am doing now. Although the rewards have indeed added a stimulating motivation to my daily studies, I believe that my motivation to study every day will remain strong. However, I may not spend extra time completing the rewards as I did before.

Researcher: Are there other gamification elements that motivate you?

P7: I don't think there's anything else. I mostly use Duolingo to help me develop a learning habit.

P8

Researcher: What do you remember as the most pleasant and the least pleasant parts of the experience?

P8: The most fun part is when XP Boost is active, as it lets me gain more experience in a short time. However, the most frustrating part is the “heart” limit, especially when I lose all my “hearts” during a course and have to spend 450 gems to get them back. But these gems are hard to come by.

Researcher: Besides from what you mentioned in the diary, if there is another reason why you have the motivation or willingness of using the application everyday?

P8: Yes, I want to learn the languages that I like which is the foundation of my motivation. Then I want to use Duolingo since I can use it free without any financial cost and its gamification really engages me to learn.

Researcher: You mentioned you wanted to catch up with your friends during the first day,Is it the reason you are motivated?

P8: Yes, it motivates me. The interaction with my friends increases my competitive spirit. Additionally, maintaining a streak is also motivating for me. It's more like a commitment to myself that keeps me going.

Researcher: You usually study for more than 30 minutes, but there are some days when you study for a very short time. Can you talk about the reasons for this? Did you encounter any special situations?

P8: It's probably because the weekend is approaching, and I wanted to relax. Additionally, the XP boost I received at the time had a short duration, so I stopped studying after it ended. The XP boost is definitely a motivator for me. I'm certain that before Duolingo introduced the XP Boost feature, I spent an average of 5–10 minutes on Duolingo each day, which was significantly less than the time I spend now with the XP Boost feature. However, with the XP Boost, I find myself more engaged and able to earn experience more efficiently. Before I knew it, I had learned more. But sometimes I feel tired about it.

Researcher: Could you talk about how the achievement system has affected you, or your thoughts on this feature?

P8: The "achievement" feature is important for me since it not only gives me "blue stones/diamonds" when I complete an "achievement", but also serves as a milestone for me to refer to my progress. The reason I have not yet mentioned my "achievement" changes is that it is rare for users to upgrade a new achievement level in one week. For me, it usually takes months to get a new achievement. Also, I have already got essentially all of the achievements so that I don’t really care about it anymore.

Researcher: Imagine if Duolingo removed these incentives and penalties, how would your usage frequency or habits change?

P8: If it removes the "Streak" feature, I might not learn it everyday. If it removes either "XP Boost" or "Friend Connection" features, I might just study 5-10 minutes now since I lack incentives. On the other hand, if it removes "heart" features or makes the number of "heart", I won't feel any extra pressure when I use it.

P9

Researcher: What do you remember as the most pleasant and the least pleasant parts of the experience?

P9: The most pleasant thing might be that while learning, it feels like a game instead of actual learning. So, it didn't make me feel stressed, and now it has a freeze feature when I skip a day so I don't lose my streak if I can't study one day.

However, sometimes, translation errors and a limited number of failures lead to my failure and loss of heart. I think this may also be the reason why I no longer use Duolingo frequently.

Researcher: Besides from what you mentioned in the diary, if there is another reason why you have the motivation or willingness of using the application everyday?

P9: Besides wanting to maintain my streak, I feel like it is an entertaining game for me. Using it for a few minutes every day before bed.

Researcher: On the 2nd day, the amount of time you used Duolingo immediately increased to 20 minutes. What was the motivation that made you study that long that day? And what made you stop spending more time using the app after that day?

P9: Because I was free that day and I just needed to finish 1 more chapter to get my treasure chest reward. Hence, I decided to study the chapter to get the reward but then the session felt really interesting so I kept studying and finished 1 other chapter. After the day, when I had my reward I just went back to the normal habit and just wanted to keep my streak maintained.

Researcher: You skipped a day because of studying and did not have time, what are your thoughts and feelings?

P9: Yes I was too busy with my studying at the time. I did feel a little bit guilty, but the freeze helped me to have my streaks still be the same, so it was good to me.

Researcher: You said the main reason you use Duolingo is to maintain the streaks and you did sometimes check your ranking, did these affect you positively or negatively?

P9: Yes I do often check my ranking. Back at the time I really cared about my ranking and it somehow positively motivated me in studying with Duolingo

Researcher: Could you talk about how the achievement system has affected you, or your thoughts on this feature?

P9: It is not the feature that I really pay attention to since I only use Duolingo for entertaining and perhaps practicing. Like some badges, such as Sleepwalker are kind of cute, but it doesn't make me excited."

Researcher: Imagine if Duolingo removed these incentives and penalties, how would your usage frequency or habits change?

P9: I think I will still use Duolingo, even though I think the encouragement mechanisms give me more motivation to study, they don't affect my willingness to study a lot if they disappear. And if the penalties are removed, I think it is good so I don't need to worry about my mistakes as much as I do now.

P10

Researcher: What do you remember as the most pleasant and the least pleasant parts of the experience?

P10: Nothing really surprised me, because I've used Duolingo before. If I had to name one thing, it would be the freezing function, which allows me to continue my streak after a day off. The number of hearts and frequent advertisements always make me quit the app.

Researcher: Besides what you mentioned in the diary, if there is another reason why you have the motivation or willingness to use the application everyday?

P10: To learn more vocabulary. I used to use Duolingo a long time ago and was really active back then. It was fun and interesting but time passed and the appeal just lost.

Researcher: As a restarted user, how do you feel? Will you continue to use Duolingo?

P10: I stopped because I didn't feel like I would learn anything new, the amount of knowledge I received was just not enough for what I wanted. It was still the same for me during the week when I was back to using Duolingo. The app for me it's just for people who are beginners or someone who just wants to have fun with it. I might

continue the streak but it's hard to keep it up for long. But if it can make me learn more deeply, it can make me stick with it.

Researcher: One of the reasons that makes you irritated is the ads after a lesson. Was it the things that made you lose interest after a long time using the app?

P10: Yes, the ads are annoying but the main reason is that the app is just not suitable for me to learn anymore. Besides that, the things that make don't like that Duolingo keep showing the rewards after lessons that after ads which I don't really care about annoyed me more.

Researcher: As you mentioned, because you don't have much time to use Duolingo and skipped a day, what are your general thoughts and feelings on that day?

*P10:*I didn't have any feeling, it was just a break day for me. It doesn't affect me in any way that I have to be concerned about."

Researcher: Could you talk about how the achievement system has affected you, or your thoughts on this feature?

P10: I really don't focus on those achievements. I know those are there and maybe you can use that to show other people and friends what you did. Yes I think they are useless for me.

Researcher: Imagine if Duolingo removed these incentives and penalties, how would your usage frequency or habits change?

P10: I'm sure I will learn longer if they do that. I don't really care about those things. I just have a will to learn more vocabulary so if they remove the heart limitation it would be great.

P11

Researcher: What do you remember as the most pleasant and the least pleasant parts of the experience?

P11: I think the most pleasant thing for me was the simplicity. I don't have to spend a lot of time on Duolingo. The app doesn't demand much or any pressure." about the pleasant parts. I think it is the repetition, sometimes I feel like I just do the same thing everyday. Also, the app doesn't have any grammar explanations, so I have to do it by myself which is kind of annoying to me."

Researcher: Besides from what you mentioned in the diary, if there is another reason why you have the motivation or willingness of using the application everyday?

P11: It's like a habit to me now. I don't think much about it. Like guilt-free being productive. Even just using a few mins a day but at least I feel like I did something useful.

Researcher: As we know, you want to keep your hobby of using Duolingo as your daily routine. How do you feel when you need to maintain your streak every day and does it help you to study?

P11: I think it is fine with me, since I have been doing the streaks for a long time now, and actually it is quite fun for me and makes me feel I am doing something to improve my language skills every day."

Researcher: Could you talk about how the achievement system has affected you, or your thoughts on this feature?

P11: I don't usually care. Yeah, for me it might be useless. Every time I got some badges I just ignored them

Researcher: Is the app for you qualified as a language learning app or just a game for you?

P11: It's more like a game for me, but it does help me with practicing my skills. Not learning much but memorizing.

Researcher: Imagine if Duolingo removed these incentives and penalties, how would your usage frequency or habits change?

P11: I still use it either way because it is my habit now. But it would be a little sad since the streaks are the main reason I do it every day. And I don't really care about the heart limitation because I barely lose all of my hearts in one day.

P12

Researcher: What do you remember as the most pleasant and the least pleasant parts of the experience?

P12: The thing that I felt the most enjoyable while using Duolingo was lessons that seemed fun to me, the amount of time for each lesson is short and fun but I often can practice different skills. I think it also helps me with practicing my language somehow, like giving me feedback and pointing out the mistakes for me.

However I think the least pleasant part for me was the heart limitation. I often learn around 1 chapter each day so with only 5 hearts, I really need to focus on what I need to do so I don't make mistakes. Sometimes it makes me anxious."

Researcher: Besides from what you mentioned in the diary, if there is another reason why you have the motivation or willingness of using the application everyday?

P12: I really like the design. It is cute and fun. Other than that, the sense of progress also drives me to be motivated.

Researcher: You seem quite active like checking your ranking and using friend tasks, how do you feel about those features? Do you think it is one of the reasons that keeps you using the app?

P12: Yes, I do think ranking and friend tasks help me to use Duolingo more. It was fun and interesting in the beginning, then I felt a little bit stressed after a few days."

Researcher: You did mention the limitations of the heart, what do you think if you lose all of the hearts and what will you deal with that?

P12: Because I usually learn 1 chapter a day and my skills are just beginner level, so I made quite a number of mistakes. I think it somehow makes me more careful, but it is still frustrating to me. If I lose all of the heart, I'd rather stop using after for a while in the day

Researcher: You skipped a day because you lost the passion for doing the ranking. Can you talk more about it? In general, do you think the leaderboard feature makes you more willing to use the app or stresses you out?

P12: Like I mentioned, after a few days doing my ranking, I just feel exhausted and I was busy that day. That's why I stopped using it for a day to rest my mind. But I think it is a good feature, it did give me motivation to learn and had fun with the app.

Researcher: Could you talk about how the achievement system has affected you, or your thoughts on this feature?

P12: Their good-looking and cute design, I don't really pay much attention to them. But I agree that it helped me somehow to increase my XPs in my ranking."

Researcher: Imagine if Duolingo removed these incentives and penalties, how would your usage frequency or habits change?

P12: I personally think I will learn more casually. Sometimes the streak drives me stressed out but the ranking is interesting for me. And about the heart limitation, it would be so good if they remove it so I can study more."

Appendix 6 Gamification Feature Technical Term Explanation

Feature	Explanation
Streaks	The number of days that the user continuously uses the app and finishes the daily study.
Streak Freeze	This feature allows users to automatically protect their streak record for up to two days, preventing it from being interrupted.
Leaderboards	Ranking the users by their XPs, (the experience points that the user will get after the studying).
Achievements	The virtual badge that can only be obtained by completing special tasks.
Hearts / Life points	Every time the user gives the wrong answer, they will lose a heart. They will have five hearts in total normally and have three hearts for skip-level quiz (Premium users will get unlimited times of tries in normal course, five hearts for skip-level quiz).
Forced repetition	If the user still cannot pass the current course, the system will ask the user to stay at the same level until all answers are correct.
Buddy System	This feature is a social function in Duolingo. It pairs two users together, allowing them to see each other's learning progress. In addition, the system randomly pushes tasks for the two to complete together.
Secret Treasure Boxes	Treasure chests on the learning path and treasure chests randomly pushed by the system. The rewards include gems or double experience boosts.

Double experience boost	A buff item that allows users to gain double experience in the same amount of time.
Daily Tasks	The system pushes random tasks to users. Typically, task requirements include ensuring a certain level of accuracy or completing a certain number of lessons. Task rewards are usually gems.

Note. Descriptions adapted from official Duolingo Blog/Help articles – Duolingo Team (2023), Mansur (2022), Munson et al. (2024), Shuttleworth (2023). Feature behaviour was confirmed via direct in-app observation (iOS Version 7.776.0, 2025-06-03).

Figures

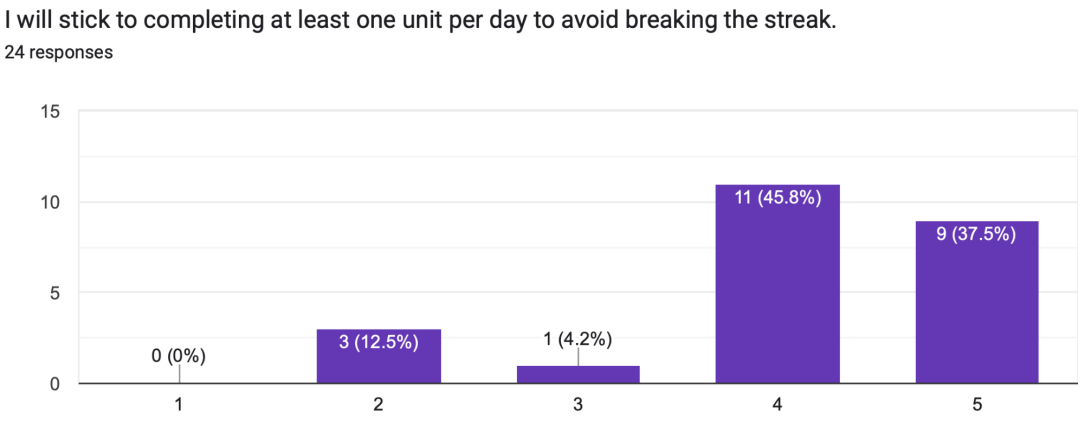

Figure 1: *Streak Question 1 Findings*

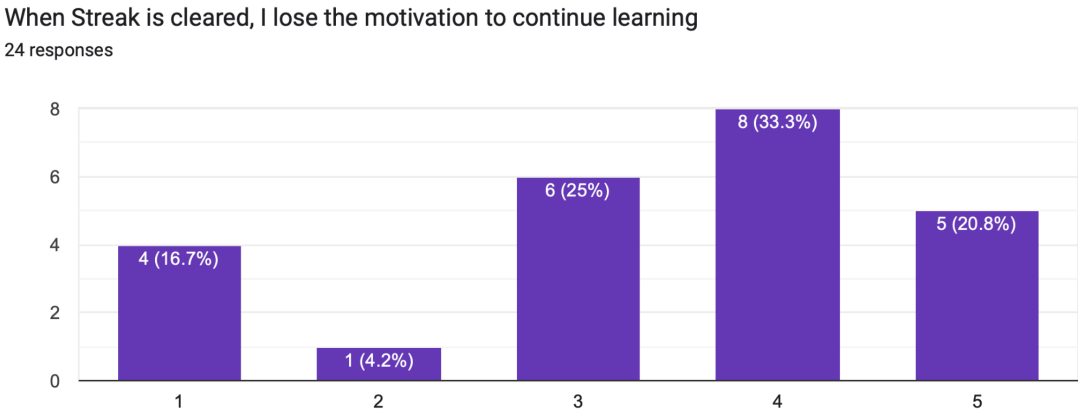

Figure 2: *Streak Question 2 Findings*

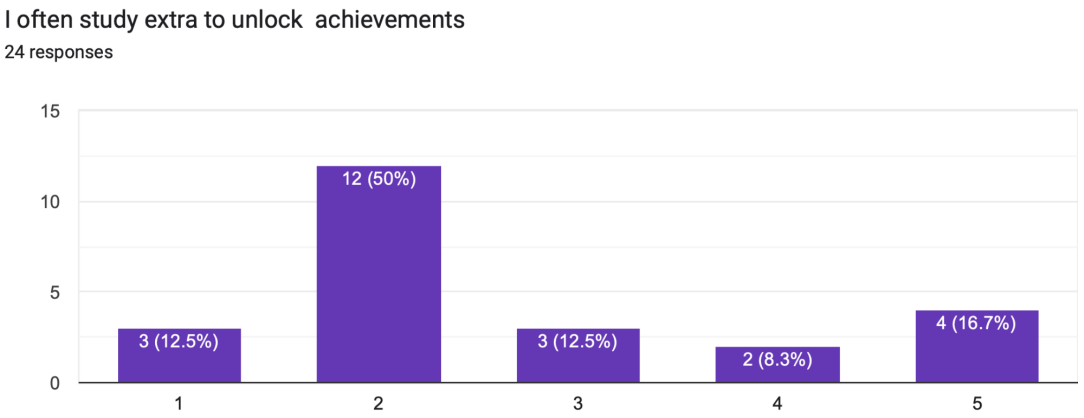

Figure 3: *Achievement System Question 1 Findings*

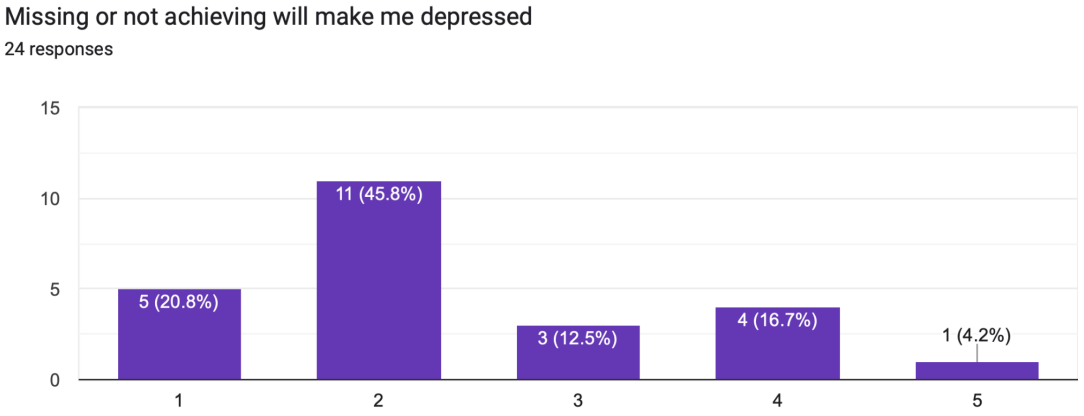

Figure 4: *Achievement System Question 2 Findings*

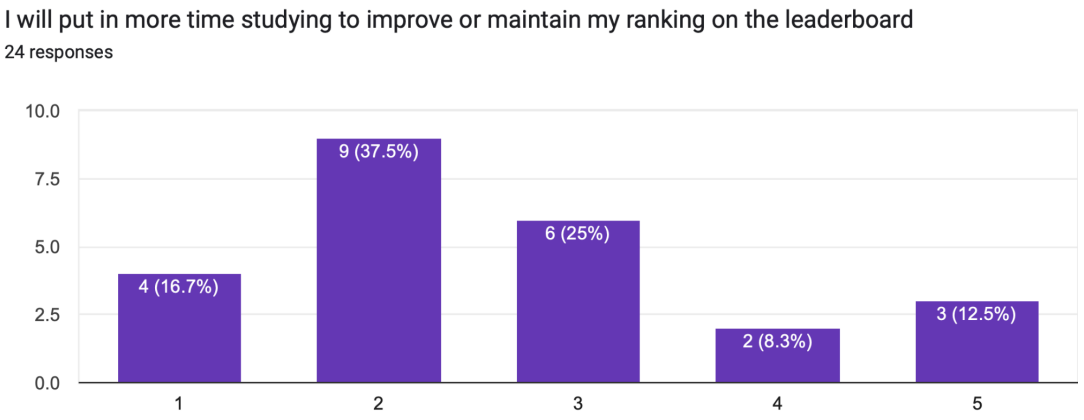

Figure 5: *Leaderboard Question 1 Findings*

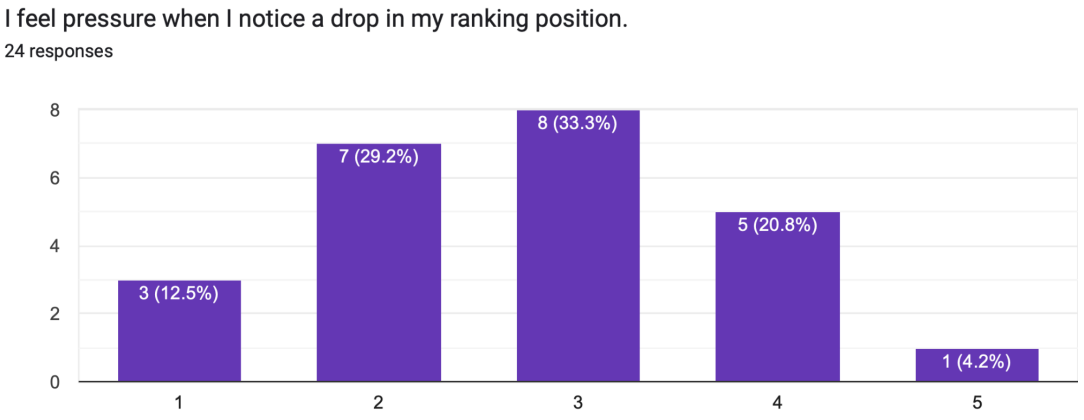

Figure 6: *Leaderboard Question 2 Findings*

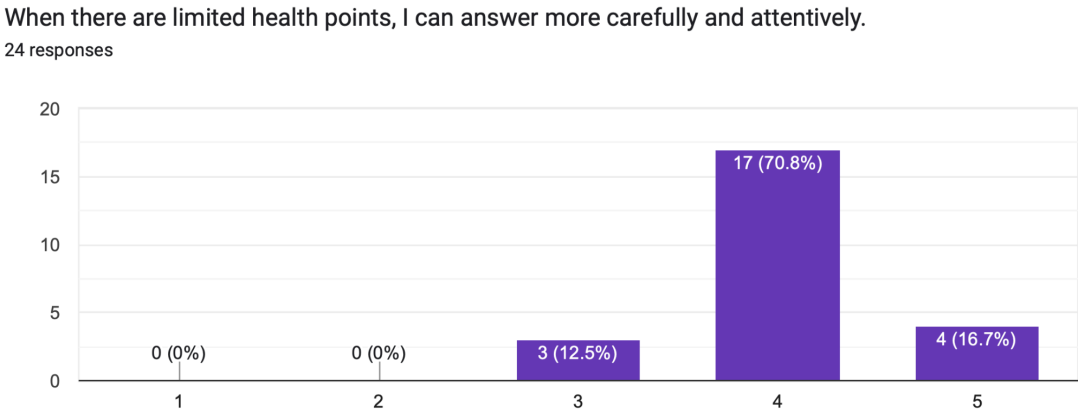

Figure 7: *Life Points Question 1 Findings*

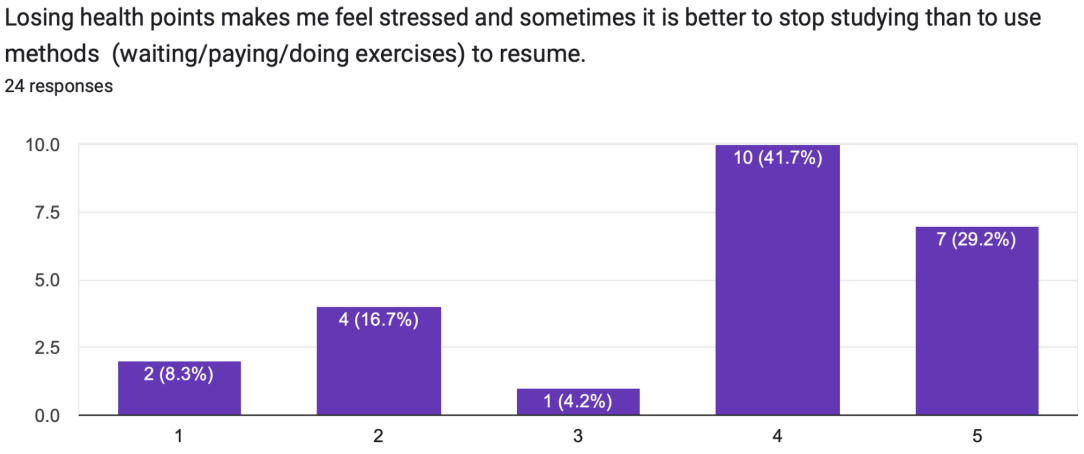

Figure 8: *Life Points Question 2 Findings*

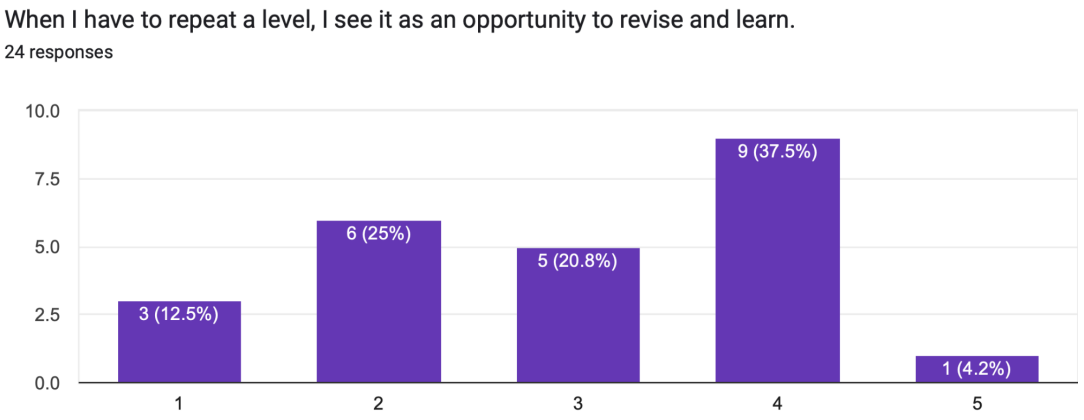

Figure 9: *Forced Repetition Question 1 Findings*

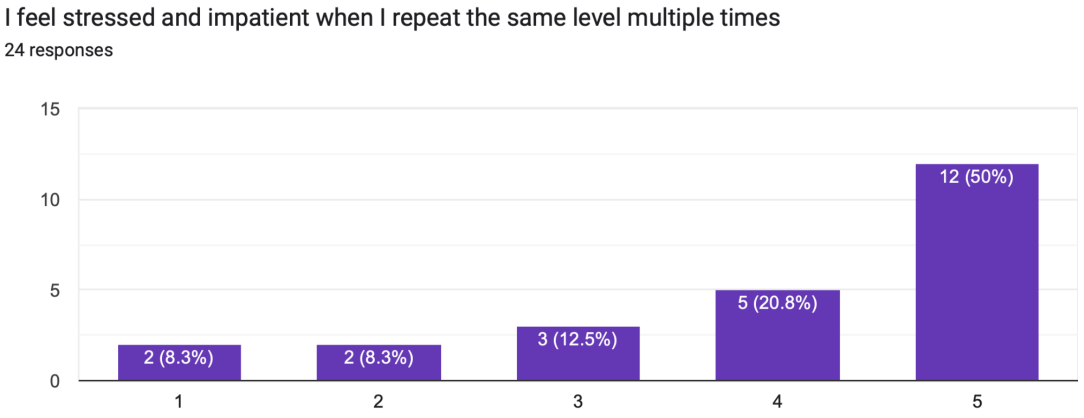

Figure 10: *Forced Repetition Question 2 Findings*

Table. User diary record

User	1. Date	2. Streak	3. Study duration	4. Number of completed courses	5. Feeling score	6. Motivation score	7. What is your motivation or reason to use Duolingo today?	8. Subjective opinion
P1	2025-3-16	22th	15 mins	5 lessons	3	4	I don't want to interrupt my learning.	Reviewed expressions for ordering food and drinks. Finished the first unit and started the second unit, learning new adjectives and words for occupations (involving 14 words). The main forms were listening exercises and choosing words to make sentences. After studying 5 units, I completed the daily special task. I refreshed my highest daily experience. The number of error-free units was 3, and I earned dozens of gems. When crossing to a new unit, I became curious and wanted to know what new things were in the next unit, so I did one more unit to satisfy this curiosity. The same words keep repeating within one unit. Although it helps with memorization, it also makes me gradually impatient. The leaderboard stirs up a sense of competitiveness in me. The function of choosing words to make sentences is sometimes confusing. For example, when translating "優しいです", the correct answer is "very gentle", but "very" has no corresponding word in the original text. So I only chose "gentle" and got it wrong, which is a bit inflexible. The ads for free users are too frequent. There is an ad after each unit. It's a bit annoying.
P1	2025-3-17	23th	10 mins	4 lessons	4	4	I don't want to interrupt my learning.	I completed four units. Since I'm still in the second stage, I only learned one new word. The main practice content was using adjectives to describe nouns. I was short on time today. Initially, I planned to do only two units and then take a break. However, the daily special tasks require at least four units to be fully completed, so I persevered and finished four units. I noticed that my friend's streak didn't continue, but I didn't give a reminder.I moved up one place on the leaderboard. The daily special tasks

								have a great motivating effect on me. When I see that there are still unfinished tasks, I always have the urge to complete them, so I feel a certain amount of pressure. However, without skipping levels, the difficulty of the questions is not high. So I was quite calm during the completion process. I found that there was a pronunciation error in the word "water" in a listening question.
P1	2025-3-18	24th	15 mins	4 lessons	3	5	I don't want to interrupt my learning.	The APP gave my friend and me a task to earn 1500 points together. This motivated me to complete several more units. My ranking went up by one place. I noticed that there are now some sentences - making questions where I need to type in the text myself, not just multiple - choice questions. The difficulty has increased. I didn't originally want to do more questions every day just to surpass the previous day. But the task with my friend made me feel a sense of responsibility, so I did a few more. I found that it's easier to answer questions correctly when I turn on the sound.
P1	2025-3-19	25th	10 mins	2 lessons	4	4	I don't want to interrupt my learning.	Today I learned 10 new words. Starting a new chapter is really exciting. To complete all the daily special tasks,I need to study at least 5 units.I don't want to push myself too hard, so I ignored this mechanism.I hope that when my ranking drops, there won't be a reminder. It's a bit demotivating.
P1	2025-3-20	26th	15 mins	3 lessons	5	4	I don't want to interrupt my learning.	Today I am more relaxed because I don't need to squeeze time out of my limited rest time. So it's been easier for me to study I achieved a promotion. I feel a comprehensive improvement in my abilities, which makes me quite satisfied and I'm in a good mood.
P1	2025-3-21	27th	10 mins	2 lessons	5	5	I don't want to interrupt my learning.	Today, I found that the app's icon had changed to a parrot with a calm expression (it had been an anxious-looking parrot for the past few days), which made me feel even better. Today,my accuracy rate was 100%. I received a lot of compliments, so I felt very satisfied.

								A treasure chest appeared on the roadmap.To win the items inside, I need to complete 6 units in the next 48 hours. This is more than I usually want to study each day, but I guess the existence of that treasure chest will make me complete three units every day.
P1	2025-3-22	28th	15 mins	3 lessons	5	4	I don't want to interrupt my learning.	Today's main learning motivation came from the task set yesterday that had to be completed within 48 hours. However, after doing three units, I found that I only need to do one more unit tomorrow, so I was in a good mood. I had a sense of reducing the burden for the next day. I would keep using this app if it didn't try to make me study more than the previous day in various ways to get the same rewards every day.
P2	2025-3-16	3th	25 mins	10 lessons	4	3	Because I'm new to duolingo and I want to keep experiencing it.	Normal practice is very simple, and it is relatively easy to pass the level, which makes me want to skip to the later levels to practice. However, the sentence-writing part of the later levels is too difficult. Also, the meaning of some sentences in Italian and Chinese differs, which makes it difficult for me to complete the practice.
P2	2025-3-17	4th	15 mins	6 lessons	3	3	I want to do more exercises.	Since I am a free user, there is a limit on the number of lives. This makes me more cautious when learning, afraid of making mistakes and afraid to try. In addition, there are video ads in the middle of each chapter pushing me to buy its VIP. The experience is not very good.
P2	2025-3-18	5th	12 mins	7 lessons	4	4	Continuing to learn Italian	The same way every time I finish a chapter, I have to wait for 30 seconds of adverts, which affects the experience, and the translation of some of the questions in it is very strange, causing me to make mistakes and thus reducing the number of hearts, which is not a good experience.
P2	2025-3-19	6th	10 mins	5 lessons	4	4	I would like to keep streak and ranking	I tried again today to skip to a later unit. Although it worked I'd still say they should lower the difficulty. If it wasn't for luck I'd probably have to continue with the earlier easy chapters if I kept failing which would probably lead me to give up on using.
P2	2025-3-20	6th(freeze)	0 min	0 lessons	0	0	N/A	N/A
P2	2025-3-21	7th	15 mins	5 lessons	4	4	Continuing to learn Italian	Yesterday I had my graduation defence, which made me very tired, so I'm going to take a day off and start again today, which I don't really feel because I don't really care about streaking, I just want to use my spare time to study.

P2	2025-3-22	8th	12 mins	4 lessons	4	4	Not having anything to do while waiting for the bus, choose to study for a while	Learning ended today because I used up all HP, and although I know I can watch adverts or wait to get HP back, I don't want to do it because it's a waste of time.
P3	2025-3-16	22th	30 mins	10 lessons	3	5	My goal is to streak 100 days I don't want to interrupt	I've been very busy recently but thanks to Duolingo's reminder feature I got started on today's study. Since I'm also studying Swedish offline, the exercises on Duolingo are easier for me. I tried to skip to the next chapter but failed because I made too many mistakes but a lot of these I think were purely because the answers were too rigid and it wasn't really since I didn't know how to do it which was frustrating. Also, it's a new week and there's a new leaderboard. I'm currently at number 3 which I'm hoping to maintain. I hope to keep it.
P3	2025-3-17	23th	60 mins	17 lessons	4	5	I would like to keep streak and ranking	I had more free time today and when my ranking dropped I wanted to maintain my previous ranking. I spent more time studying and I did some extra exercises to gain experience faster to maintain my ranking.
P3	2025-3-18	24th	40 mins	10 lessons	3	4	I would like to keep the streak and ranking	I had a bit of a problem today because I didn't learn some of the words in the earlier chapters well enough, so when I needed to spell them in the later chapters I made repeated mistakes, which made me impatient, and I didn't find anything like a vocabulary list, which made it difficult for me to review and left me to just learn by making mistakes.
P3	2025-3-19	25th	40 mins	13 lessons	4	4	I would like to keep streak and ranking	It's been a normal day, and I've maintained my progress as in previous days I've gained experience by practising fast to keep my ranking. When I am notified that I've been overtaken in the rankings, I won't worry too much about it because I think I'm capable of keeping the rankings.
P3	2025-3-20	26th	15 mins	5 lessons	3	2	I would like to keep the streak and ranking	I've had a busy day and I'm in a bad mood, I almost forgot to use Duolingo, and I only started in the evening when I was reminded by a message from the software. Although I was a bit annoyed when I saw the message, in order to reach my goal of 100 days of streaking, I will continue. And in my slight impatience, I made more mistakes than usual. I'm not sure that repeated review of mistakes within a chapter is a certain kind of study method, but I would like to have a simple review after I make mistakes and then a uniform test of them. I'm not sure that repeated levels in one lesson aren't some kind of study method, but I'd like to do a brief review after I've made a mistake, and then I'd like to be able to test my mistakes in a consistent manner.

P3	2025-3-21	27th	10 mins	3 lessons	2	3	I would like to keep the streak and ranking	Today was a bad day, to say the least. I didn't have much time to use Duolingo. I was going to start a new lesson as before but some unfamiliar vocabulary made me make repeated mistakes, which caused me to just quit that lesson. But I still want to keep the streak going because I've been on a streak for almost a month now, and I really don't want to be interrupted by unexpected events so I've chosen 3 practice chapters because they're very simple. Also, my rankings have dropped because I haven't studied in the last few days and I'm no longer trying to hit the top 3 because I'm already too far behind.
P3	2025-3-22	28th	30 mins	10 lessons	4	4	I would like to keep the streak and ranking	It's the weekend, and I have relatively more free time, so I'm keeping up with my normal study schedule, but rather than study more to improve my rankings, I'm looking forward to next week's leaderboards, and maybe because I'm ranked low this week, I'll be matched with less competitive opponents next week. It might make it easier for me to keep my rankings high
P4	2025-3-16	21th	20 mins	5 lessons	4	1	Start a new language practice.	The overall mood today is relatively pleasant because the current progress and teaching speed are within an acceptable range, and it doesn't feel intimidating because it's too complicated. Regarding the low motivation, a large part of the reason is personal. I am not willing to continue learning today when my schedule is relatively full. In terms of pressure, the content I am currently learning is very simple, but I am a little nervous because I only have five chances to get it right.
P4	2025-3-17	22th	40 mins	12 lessons	4	3	Because of the reminder card from Duolingo.	Since I already started to master the types of exercises and methods of completion yesterday, my subjective drive has increased today. In addition, the chapter where I am is not difficult, so I am still in a relatively relaxed and enjoyable state when using it. About the function:
P4	2025-3-18	23th	15 mins	5 lessons	4	3	Being alerted by duolingo	Today's exercise wasn't too difficult and I'm getting used to the life-value mechanic, which adds to my stress but at the same time it makes me answer the questions more carefully.
P4	2025-3-19	23th (freeze)	0 mins	0 lesson	0	0	N/A	Not used due to sickness
P4	2025-3-20	24th	10 mins	2 lessons	5	2	The experience of using it before was still good so after the break wanted to go	Yesterday I had a day off due to illness, but when I opened the app today I was pleasantly surprised to find that my streak was not completely cleared, but rather frozen, and that I was able to keep the streak going through today's study.

							back to review and continue learning	
P4	2025-3-21	25th	5 mins	1 lesson	3	4	To keep the streak	I was slightly careless today, and I didn't have enough study time causing me to make continuous mistakes, which resulted in me not having enough HP, therefore, I stopped studying quickly. This affected my ability to complete the task.
P4	2025-3-22	26th	22 mins	5 lessons	4	4	I haven't learnt a lot the last few days, but it's the weekend and I want to learn more.	The system automatically gives me small, easy tasks to complete, which is exciting, and I'm learning more by doing them without realizing it. Also, mistakes over and over again in the chapters makes me impatient. I know review is necessary but I'd rather finish this section and revise in unison instead of being stuck here all the time.
P5	2025-3-16	116th	15 mins	3 lessons	5	5	streak	During the use, I tend to open Duolingo to continue my winning streak. Today's Japanese words are a little stressful, and some past tense grammar is a little difficult for me. I don't like learning very much, but I will make myself persist.
P5	2025-3-17	117th	15 mins	3 lessons	4	5	learning language	Today was mainly a review, which was not that stressful for me, as I only needed to consolidate my previous memories. However, I would pay more attention to some of the inaccuracies in vocabulary and grammar. Overall, this was a pretty good learning experience.
P5	2025-3-18	118th	20 mins	4 lessons	4	4	streak	Limited-time treasure chests will make me want to complete the task quickly so that they can get rewards. Sometimes the initial letter of the word is not clear, which makes me wonder what word to fill in.
P5	2025-3-19	118th(freeze)	0 min	0 lesson	0	0	N/A	Today I am very busy after my whole day's work and wanted to have a rest with my friends. So we went out for BBQ and sang Karaoke until midnight and then back home. I felt so guilty about not continuing my Duolingo today, and the streak froze as well. I will do more tomorrow to catch up and continue the counting of my streak days.
P5	2025-3-20	118th(freeze)	0 min	0 lesson	0	0	N/A	N/A

P5	2025-3-21	119th	15 mins	3 lessons	4	2	restart	If I don't study, my streak will be cleared. I spared a short time in order to take part in Duolingo studying. Today I feel that it is more difficult to continue to study. I feel that this is not a good start so I force myself to study. Of course my motivation has an impact.
P5	2025-3-22	120th	10 mins	2 lessons	4	4	streak	Duolingo is very interesting to me. Words are hard but they make it easy to memorize. I often forget I’m even studying. It feels more like a game than a language lesson. That’s why I’ve been able to stick with it longer than I expected.
P6	2025-3-16	339th	12 mins	2 lessons	5	5	streak	Today's Duolingo chapter has one new knowledge section and one review section. I am familiar with reviewing so I can finish both chapters very quickly. And it is a good thing that I can encourage each other with my friends to keep learning continuously. So there is no great pressure on me.
P6	2025-3-17	340th	10 mins	2 lessons	4	5	streak	I was busy at work today so tonight's study was a little stressful for me because I was a little tired from work, but I insisted on finishing a chapter. I studied pronunciation and grammar today, which was very helpful to me so I think I will continue.
P6	2025-3-18	341th	17 mins	3 lessons	4	4	streak	I studied 3 lessons today, and I feel that I am in a good state today. The first chapter is about the explanation of the terms of the day of the week, which is very interesting to me. I practiced listening and reading. The second chapter is mainly about the use of words in sentences. The third chapter is mainly about review. So today's mood and pressure are more acceptable to me.
P6	2025-3-19	341th(freeze)	0 min	0 lesson	0	0	N/A	Today there were a lot of meetings, and I completely forgot to open Duolingo. When I went to bed and found that my streak had been frozen, I was glad that it hadn't been reset to zero, and I would continue to use it tomorrow
P6	2025-3-20	342th	10 mins	2 lessons	4	4	streak	After a long workday, I don’t have much brain power left. But Duolingo doesn’t make me feel guilty — even five minutes counts. It’s a low-pressure way to stay engaged.
P6	2025-3-21	343th	3 mins	1 lesson	3	2	streak	Lately I’ve been doing Duolingo just for the streak. I don’t really feel like I’m learning anymore, I just click through the lessons mindlessly. It’s starting to feel more like a chore than something fun. But I still can’t bring myself to let the streak die.

P6	2025-3-22	344th	18 mins	3 lessons	3	2	streak	I’m kind of tired of the same repetitive exercises every day. Sometimes I just rush through without even reading the sentences. I know that’s not how I’m supposed to learn, but at least I’m still showing up. Maybe my motivation will come back soon
P7	2025-3-16	29th	10 mins	1 lesson	5	5	streak mostly, but fun	When I see the app icons of Duolingo changing, I feel very funny and curious about what changes the icons will present. It is easy to arouse my interest and make me want to continue to complete the daily tasks to see what new changes will be.
P7	2025-3-17	30th	10 mins	1 lesson	3	4	streak as well	When practicing speaking, the app cannot detect my words. And sometimes I need to repeat the sentences. This makes me a little bit annoyed.
P7	2025-3-18	31th	10 mins	1 lesson	4	4	streak	Limited-time treasure chests will make me want to complete the task quickly so that they can get rewards. Sometimes the initial letter of the word is not clear, which makes me wonder what word to fill in.
P7	2025-3-19	32th	20 mins	3 lessons	4	4	streak	When I want to practice the short story, the app always shows "loading", and I often have to skip this part. Some connected parts are hard to figure out.
P7	2025-3-20	33th	10 mins	1 lesson	4	4	streak	When I learn a new word, I want to know how to use it and in what contexts I can use it. This makes me want to spend more time learning new content
P7	2025-3-21	34th	10 mins	1 lesson	4	4	streak	When reviewing words I learned before, sometimes I need to think longer just by looking at the first two letters. When practicing speaking, sometimes the system cannot recognize individual words and I need to wait, which is a bit bad.
P7	2025-3-22	35th	10 mins	1 lesson	3	4	streak	When reviewing chapters and practicing grammar, sometimes the system cannot recognize pronunciation and will choose similar words. If you don't check carefully, the sentence will be wrong.

P8	2025-3-16	256th	45 mins	8 lessons	3	4	streak continuance.	I need to catch up with my friend on Duolingo in terms of weekly XP. I use a special offer which is "Double XP for 40 minutes" while learning today. 40 minutes without rest is long for me which makes me tired. I was not emotional in today's learning because of the long learning time, actually it was a calm learning period.
P8	2025-3-17	257th	30 mins	7 lessons	4	4	streak continuance	I have not done any questions related to "speaking" since it does not work on my end (I don't know why, not sure if it's a technical issue. It just cannot recognise my pronunciation even though I am 100% sure I speak correctly). I finished all the 3 Daily Quests today so I can have 10 minutes of "triple XP in lessons" tomorrow. I am currently on the 2nd place of leaderboard. I feel excited.
P8	2025-3-18	258th	50 mins	11 lessons	4	4	streak	I used a "Triple XP Boost" for 10 minutes at first. Then as I completed the Daily Quests one by one, I obtained 20 minutes more for the Triple XP Boost, so I used 30 minutes of Triple XP Boost in total today. The Triple XP Boost is my favourite thing while learning on Duolingo. It makes accumulating XP very easy and efficiently. And I love to see my XP growing fast and catching up with other users who have more XP than me. I would say the Triple XP Boost really motivates me to a high extent for learning languages on Duolingo.
P8	2025-3-19	259th	35 mins	8 lessons	4	4	streak continuance	I dislike the Heart function at the top right screen. Each time I made one mistake the number of hearts was deducted by 1. And I have to spend 450 blue stones to refill hearts each time I run out of hearts if I want to continue studying right away. It is such a discouraging setting that I cannot change. I have spent 900 blue stones to refill hearts twice today actually. And Duolingo only allows paid membership users to get unlimited hearts now which is so disappointing.
P8	2025-3-20	260th	30 mins	6 lessons	4	3	feel boring when taking the bus	I am outside and having fun today when I learn Duolingo, so the experience is relaxed and not rushed. I also used the "Triple XP Boost" for 30 minutes, so the accumulation of the XP is really efficient. I also did all the Daily Quests today.
P8	2025-3-21	261th	17 mins	3 lessons	4	4	streak	I only finished 2 courses today because I only got 10 minutes of "Triple XP Boost". I love to study with "XP Boost" since that is really efficient in terms of accumulating my XP.
P8	2025-3-22	262th	15 mins	3 lessons	5	3	waiting for cooking	I was using it while chatting on my phone, so I spent 15 minutes finishing a course. I felt a little stressed since the thing I was doing at the same time was relaxing. I feel happy as long as I finish my daily streak.

P9	2025-3-16	12th	8 mins	3 lessons	3	4	Maintaining my streak and Study	I used Duolingo today to learn new knowledge. It was ok and I learnt some new English words. The most enjoyable thing today is the part when I finished my friend task this week and I'm ranked 3rd place in Gold League. I did not make any mistakes today so it was fine for me and I did not feel frustrated today.
P9	2025-3-17	13th	20 mins	4 lessons	4	5	Maintaining my streak, Having achievement and Study	In today's session, I wanted to finish the chapters to get the present. It was good and I have motivation even though it took quite an amount of time since I usually just spend a few minutes using Duolingo. I had a total of 4 mistakes today, I was lucky to have less than 5 so I could get the present today. Other than that I checked my ranking as well and I went to 2nd rank today.
P9	2025-3-18	14th	2 mins	1 lessons	3	3	Maintaining my streak	Today I just wanted to maintain my streak because of the limited time I had. It was fast and ok so I didn't have much feeling about it. I will try to learn tomorrow.
P9	2025-3-19	14th(freeze)	0 min	0 lesson	0	0	N/A	I skipped today because of studying and didn't have time. I felt kinda guilty because my target is to study everyday. I'll try to study and maintain my streak in the next few days.
P9	2025-3-20	15th	5 mins	2 lessons	4	3	Maintaining my streak	Since I don't have much time currently because of studying, I used Duolingo not much in the past couple days. Today's session was good. I learnt some new words and it was fun. The most annoying part today was I got a mistake since it wasn't my fault, maybe because of the wrong translation of the app.
P9	2025-3-21	16th	5 mins	2 lessons	3	3	Maintaining my streak and Do a Friend task	So one of my friends notified me about the friend task and I did it. It was cool and I have no bad feelings about today's session. I made 2 mistakes today.
P9	2025-3-22	17th	10 mins	3 lessons	4	4	Maintaining my streak and Studying	Overall, It was fun and I did learn a few new words. And I made no mistakes today. Hopefully I will have the passion to use the app more often after this.
P10	2025-3-14	1th	5 mins	2 lessons	3	3	Re-start my streak and Get an achievement	Today is the first day I go back to using Duolingo. My lessons were quite okay, nothing was stressful. I don’t use the app so often but I will try to have my streak over 7 days this week.

P10	2025-3-15	2th	5 mins	2 lessons	3	3	Want to maintain my new streak	The lessons were okay to me. I just want to keep my streak, so I did not learn many things today. Since I used the app for a long time, I think the app is good for beginners who want to learn new words and have fun learning languages. Now it just feels like a game for me to use.
P10	2025-3-16	3th	8 mins	3 lessons	3	2	I wanted to keep with my streak	Today's session was fine to me. The thing I still don't like is after every lesson I will have long ads, And I was restricted after making a mistake 3 times and could only wait to restore my life. In addition, I need to find time to maintain my streak so that I can dare to be stressed. Today's experience was not very good.
P10	2025-3-17	3th(freeze)	0 min	0 lesson	0	0	N/A	N/A
P10	2025-3-18	4th	2 mins	1 lesson	2	2	Just wanted to maintain my streak after skipping a day	I know that when there is a one-day interruption, the streak recording will be frozen instead of being cleared. So I skipped it yesterday because I used Duolingo a long time ago and even made a ranking, but then I felt that I didn't gain more knowledge. I feel the same way now. This makes me a little discouraged. For me, it's more of a game than a learning app. I'm feeling better after a day of rest, and I'm starting again today. I hope to continue learning and maintain the streak.
P10	2025-3-19	5th	3 mins	1 lesson	3	3	Keeping my streak for this week	I'm doing fine today, I haven't encountered any problems and I've received compliments from friends. I'm very happy.
P10	2025-3-20	6th	8 mins	3 lessons	3	3	Maintaining my streak	Today's session was good but I had one problem with the conversation while listening was too long. Other than that it was good for me.
P11	2025-3-14	155th	5 mins	1 lesson	5	3	I used it to maintain my streak and hope to learn new words	Today's session I’ve picked up quite a few new words and phrases through repetition. But when it comes to grammar and speaking skills, I feel that the app falls short. I made no mistakes today. Other than that I just want to maintain my streak as a daily hobby. Hence I choose to have bite-sized lessons so make it easy for me to practice without feeling overwhelmed
P11	2025-3-15	156th	3 mins	1 lesson	3	3	I wanted to maintain my streak since it is my daily routine now	Today I did not have much time to use the app. Yet I still just want to maintain my streak since I have a 156 days streak till now. The lesson was ok, nothing much to know since it's just a few. Using this app is quite my daily habit and I like it, but sometimes keeping the streak kind of makes me irritated even though I think it's good for me.

P11	2025-3-16	157th	5 mins	2 lessons	3	3	I just wanted to use the app as my daily routine	I was quite busy today but still spent some time trying out some lessons. The lessons were fine and fun. Yet my motivation was only because of maintaining the streak instead of learning. I made 2 mistakes today.
P11	2025-3-17	158th	5 mins	1 lesson	4	2	Maintain streak and Study	Today's session was good for me. I only want to maintain the streak and maybe learn at least 1 new word today. Because I only got 1 lesson so I did not have much to feel. I made no mistake today.
P11	2025-3-18	159th	8 mins	2 lessons	4	3	Maintain streak and Do friend tasks	For today's session, I just took 2 lessons for the friend tasks, it was fun since my friend told me to finish those tasks. It did not take much time. I have no bad feelings today while using the app. I had no mistakes today as well
P11	2025-3-19	160th	12 mins	3 lessons	4	4	Maintain streak and Study	Like yesterday, I used the app to maintain my streak and study. Yet the lessons kind of repeated so I did not have new things to learn. I had 2 mistakes today but one of them was not my fault because the translation of the app was wrong. I checked my ranking as well but it was still the same.
P11	2025-3-20	161th	10 mins	3 lessons	3	3	Maintain streak and Study	For today, I used the app for learning and maintaining my streak. I checked the leaderboard. I have maintained a high ranking this week, and I will continue to work hard next week.
P12	2025-3-13	1th	30 mins	6 lessons	4	3	I used the app today to study Mandarin	The session was okay for me and I had a good start using it, yet I think the vocabulary in the app is disjointed and lacks coherence. I made no mistakes today.
P12	2025-3-14	2th	15 mins	3 lessons	3	3	To study Mandarin	Since the content is relatively simple, I tried to skip to the next chapter, and it worked. But I have to say that the test with only three chances made me very nervous. In addition, I tried the buddy function, where we encourage each other to learn
P12	2025-3-15	3th	30 mins	6 lessons	4	3	I wanted to study and do the ranking	Today I skipped 2 units to learn harder lessons. It was going well and I got to know 3 new words. Today was the first day I tried a Friends feature to send a friend a gift and celebrate him, because the app reminded me that I can do it. It was fun to use it. I made 3 mistakes.
P12	2025-3-16	4th	20 mins	4 lessons	4	4	Doing my ranking and Study	The most enjoyable thing today was I could understand some new phrases and words. Yet the arrangement of words in Vietnamese (maybe because of the translation here again if she meant it) was so bad. I made 2 mistakes today.

P12	2025-3-17	4th(freeze)	0 min	0 lesson	0	0	N/A	N/A
P12	2025-3-18	5th	10 mins	2 lessons	4	4	Do my ranking and Study	I skipped one day because I lost my passion to do the ranking. I usually use the app for studying and do the ranking but yesterday I did not have a feeling to do it so I skipped. I learned more about how to structure a sentence in a new way and some new words. I felt today's session was good and had no bad feelings. I made 2 mistakes today. I used the celebrate friend's achievement feature for a friend.
P12	2025-3-19	6th	20 mins	4 lessons	3	3	To study	I just wanted to learn today without thinking about anything else. I got a celebration from a friend today for my past achievement so I celebrated with him back. I lost 3 hearts today.