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User Perceptions of Vocabulary Learning Features in Duolingo and Babbel: A Comparative Analysis of Effectiveness and User Satisfaction

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Abstract: This study conducts a comparative analysis of two prominent mobile applications for language learning, Duolingo and Babbel, focusing on their vocabulary acquisition features through the lenses of Spaced Repetition Theory (SRT) and Cognitive Load Theory (CLT). Utilizing a content analysis methodology, user reviews from the Google Play Store were systematically coded and analyzed to identify key themes related to usability, user satisfaction, and learning effectiveness. The findings reveal that Duolingo excels in engaging users through gamification and interactive elements, fostering a playful learning environment that encourages consistent practice. However, its structure may lead to increased cognitive load due to a lack of clear guidance. Conversely, Babbel offers a more systematic and formal approach, emphasizing grammar and real-life context, which effectively reduces cognitive load and enhances vocabulary retention. Despite its strengths, Babbel's lack of gamified elements may limit user engagement. This research contributes to the understanding of Mobile-Assisted Language Learning (MALL) by highlighting the strengths and limitations of each application, providing insights into future development in language learning technologies. The study underscores the importance of aligning application design with user preferences to optimize vocabulary learning outcomes.

Key Words: Duolingo, Vocabulary Acquisition, Babbel, Cognitive Load Theory, Spaced Repetition Theory, User Perceptions, Content Analysis, Mobile-Assisted Language Learning (MALL)

Introduction

Applications for learning languages have emerged as a preferred means of utilizing technology to expand lexical production and refine linguistic abilities. The Duolingo and Babbel applications are the most popular because they use completely different learning approaches that should work for almost any learner. In designing their applications, Duolingo uses a lot of game elements such as streaks and rewards to provide users with fun, while Babbel is more systematic and teaches grammar as well as real-life usage.

Background of Study

I. The Emergence of Mobile Applications in Language Education

Education through language was enhanced by mobile technology which resulted in the development of MALL, which has many opportunities to create phone learners around the globe. The social availability of smartphones and tablets has enabled learners to engage with educational content anytime; this aspect of self-directed learning enhances the use of language by the learners (Irudayasamy et al., 2021; Darsih & Asikin, 2020). Such mobility has been popularized by applications such as Duolingo and Babbel, which have embedded new-era features such as interaction and Personalization of the learning material in a broad Theme and learning style. They are appreciated for their ability to offer interesting and easy-to-use and therefore, have become essential parts of language learning in current society (Kacetl & Klímová, 2019; Gafni et al., 2017).

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Kukulska-Hulme and Viberg (2017) postulated that over time, one of the decisive drivers of the success of mobile language apps is gamification aimed at promoting motivation and engagement due to features such as incentives, uninterrupted sequence, and records. Adaptive learning is also facilitated through the extra features of these applications providing feedback and customising content according to needs when learning a second language making the process more effective and faster (Darsih & Asikin, 2020; Zhovnir, 2023). Other elements of collaboration also contribute to social activities which bring together the learners, increasing the learning process. Thus, mobile applications have not only been providing complementary solutions to extend traditional language instruction but also revolutionizing pedagogy by using technology to address new needs of learners (Irudayasamy et al., 2021; Kacetl & Klímová, 2019).

II. The Critical Role of Vocabulary Acquisition in Language Learning

Language learning begins with the acquisition of new words because words make up the basis of efficient interaction and understanding. A wide and diverse vocabulary is the foundation of fundamental language skills, including reading, writing, and speaking; a component that predicts overall language acquisition (Başal et al., <u>2016</u>; Alsanousi, <u>2023</u>). Investigations also stress the fact that vocabulary is positively associated with language proficiency in various manners of communication to call attention to it as a determinant factor for precise and concise typing and conversation (Betoncu et al., <u>2021</u>; Panfilova et al., <u>2022</u>).

Modern mobile applications in mastering vocabulary have introduced challenges of presenting vocabulary by methods like spaced repetition, quizzes, multi-media objects, and others. Besides the usual advantages of increasing retention that is achieved with the help of these methods, the processes are also interesting and fun (Başal et al., 2016; Panfilova et al., 2022). These apps involve such other features as contextual vocabulary and idiomatic expressions that enable learners to imitate the natural manner of using the target language in real-life situations. It also lets the users practice the vocabulary in real-life scenarios, which helps them to improve learning retention over time (Poláková and Klímova, 2022). Therefore, effective vocabulary learning is still at the forefront of language instruction; mobile applications are further evolving by endeavouring to fulfil the requirements of the contemporary learner (Irudayasamy et al., 2021; Panfilova et al., 2022).

Purpose of the Study

The primary objective of this study is to conduct a comparative analysis of user perceptions regarding vocabulary learning features in two prominent language learning applications: Duolingo and Babbel. Thus, regarding the objective of this work, this study aims to evaluate how these platforms can help with the learning of vocabulary and evaluate user satisfaction with various features and learning strategies adopted by the applications.

Research Objectives

- 1. To analyse user perceptions of vocabulary learning features in Duolingo and Babbel through feedback and reviews, identifying key strengths and limitations of each platform.
- 2. To evaluate the implementation of Spaced Repetition Theory in the design of Duolingo and Babbel, focusing on how each app reinforces vocabulary retention over time.
- 3. To compare the design approaches of Duolingo and Babbel, highlighting how gamification and structured learning influence user engagement and learning outcomes.

Research Questions

- 1. How do Duolingo and Babbel users perceive the vocabulary learning features provided by these platforms?
- 2. To what extent are the principles of Spaced Repetition Theory integrated into the design and functionality of Duolingo and Babbel?
- 3. How does Duolingo's gamified approach to vocabulary learning differ from Babbel's structured methodology in terms of user engagement and satisfaction?

Significance of Study

This study makes a substantial contribution to the field of language education and application as it offers a detailed comparative analysis of the two most popular applications, Duolingo and Babbel. By evaluating



these applications through established educational theories, the research offers actionable insights for developers to enhance app functionalities, thereby improving learning outcomes. It also sheds light on how different design approaches affect user engagement and satisfaction, informing educators about the effective integration of these tools into language curricula. At the same time, the research enhances the worldwide body of knowledge concerning Mobile-Assisted Language Learning (MALL) by focusing on cognitive load theory and spaced repetition in app design. Finally, it outlines the areas still left with missing features in current L2 systems and directs the subsequent research towards the development of various strategies that may enhance L2 learning in a digital environment.

Literature Review

Features and Functionalities of Duolingo

Duolingo is one of the most popular language learning apps, which is famous for its elements that help to boost your vocabulary and the language level in general. One of the most important considerations of its design is, however, the incorporation of game aspects that contribute greatly to the overall user experience. These gamified traits include points, levels, and tangible incentives that engage learners because they help them achieve desirable goals and grow (Faradisa et al., 2022; Nurhisyam, 2023). This strategy of learning in gaming makes learning a fun exercise where it becomes more natural and engaging to have to practice and monitor one's progress (Hadina, 2023; Purwanto, 2023).

To support those language skills, Duolingo uses a set of exercises that involve reading, writing, listening, and speaking. There is the translation of sentences, literally followed by a picture, fill-in, and all sorts of activities which help remind the meanings of the words and help to enhance the understanding regarding structures underlying languages (Faradisa et al., 2022; Fitria, 2023). Also, its adaptive learning characteristic provides an individual approach to controlling task complexity according to the learner's performance level, which means that the program challenges learners within their comfort level (mastery level) but not beyond that (Chen, 2016). Research has always proven Duolingo's efficiency, and the tests have revealed that the increase in vocabulary retention among Duolingo users is much higher than that in the learners who employed traditional approaches (Nurhayati, 2024; Megawati et al., 2023). For instance, Nurhayati (2024) argued that students using Duolingo were found to achieve better scores in vocabulary compared to conventional methods, expose and effective in keeping the user motivated and interested in learning any language more (Faradisa et al., 2022; Megawati et al., 2023).

User Perceptions and Experiences

The perception that users have of the Duolingo application is relatively positive, given the satisfaction levels of the learners regarding the utility of the features and functionalities of the application. Some of the feedback that many users have posted regarding the app focuses on the aspects of the app and related features that many users find enjoyable and motivational (Hadina, 2023). For example, Nurhisyam (2023) presented the surveys of students, who said that the performance of the application Duolingo was interesting and helpful because of the presented game elements and the possibility for interactivity. In the same manner, Hadina (2023) discussed that users see the benefits of the app in terms of the improvement of the main ideas and language proficiency stimulated by the contest-like component and active engagement in learning.

Nevertheless, there are some issues that particular users face while using the application of Duolingo application. Some students find it difficult to orient themselves in the application or comprehend linguistic concepts, especially in the grammar areas, because of insufficient descriptions (Fakhrurriana, 2024; Faradisa et al., 2022). According to Fakhrurriana (2024), these gaps in instructional depth might reduce the learning process of some users, thus preventing them from understanding structures in language. Suhardi and Hidayatullah (2023) also reasoned that since Duolingo depends heavily on gamification, not all learners prefer to play games or have a gamified approach rather than a structured and genomic approach over games (Faradisa et al., 2022).

Features and Functionalities of Babbel

Babbel is distinct from many language learning applications because it contains a large number of lessons as well as has an appreciable focus on grammar, making the process of learning much more organized and

efficient. Every lesson in the set includes the presentation of new concepts in terms of vocabulary and grammar to allow the gradual development of learners' language knowledge (Essafi, <u>2024</u>). Ensuring that the learning process is formatted systematically serves the users who can absorb a lot of information effectively, giving out organized objectives and outcomes that boost learner confidence and motivation (Tran, <u>2024</u>).

One of Babbel's great features is the use of grammar presentation during the lesson plan, which both describes the rules comprehensively and gives the exercised words their context (Shadiev et al., 2019). This contextual learning amplifies the use of language, specifically for the enhancement of language skills as well as the ability to recall and use certain terms in practice. Further, Babbel makes use of spaced repetition, which brings the learned material back into the user's focus at optimal intervals according to the practice of spaced repetition proposed by Essafi in (2024). Additional aspects of the functionality include quite engaging cases such as exercises, integrated voice recognition and pronunciation practice, and individual final checks or reviews based on the learner's performance or progress (Santos, 2020; Persson & Nouri, 2018).

User Perceptions and Experiences

Overall, people are satisfied with Babbel, with the specific organization of the application and its extensive course. Some of the points raised by learners include clear lesson objectives demonstrated in Babbel and the sequential assimilation and elaboration of lessons that include vocabulary, grammar, and pronunciation (Tran, 2024). For example, Anderies (2023) said that users appreciate the tracking of the results they get thanks to Babbel's structured lessons, which help build trust in the language learning process.

Comparisons made with Duolingo show that there are significant differences in the preferred choices displayed, primarily due to learning style and the learner's preferred approach. As such, Babbel is preferred for wider and more comprehensive grammar explanations, which are more helpful to some learners in memorizing the structural features of the language (Saad & Rahim, 2021; Powers, 2018). In contrast, the presented Duolingo style of learning with the help of apps that make the process look like a game attracts users who are tired of the strict and formal language learning (Powers, 2019; Sakas & Reklitis, 2021). While Babbel has more depth and organization for learners who are serious about getting academic results, Duolingo attracts those with competitive personalities and those who want to learn with fun (Apoko, 2023).

Theoretical Framework

This work uses Spaced Repetition Theory (SRT) and Cognitive Load Theory (CLT) to assess the use of spaced repetition for vocabulary by Duolingo and Babbel. Spacing learning sessions over time is far more effective than massed practice and retrieving practice according to the Spaced Repetition Theory advanced by Ebbinghaus in 1885. SRT is incorporated in language applications like Duolingo and Babbel through algorithms that timetable the vocabulary according to the user's performance. These systems are advanced to enhance retention with regards to encouraging users to revisit words at the right times, which makes them easily remembered at the end of the day, hence enhancing greater learning.

Cognitive Load Theory (CLT) by Sweller (<u>1988</u>) extends the work done in SRT, where it is suggested that the quantity of presented information and required mental processes must be optimally adapted to learner needs. CLT defines three types of cognitive load: intrinsic, extraneous, and germane, and postulates that reducing extraneous load while increasing germane load leads to a high level of learning. The fact that Duolingo is a game makes it easier to attract learners, but the excessive use of what we call gaming techniques might create a high extraneous load due to elements like timed activities. Lack of such organization may increase the level of difficulty, and thus, cognitive load in comparison to Babbel's lessons, which set rather clear tasks and systematically build up the material, promoting the creation of schemas and improved learning.

This framework comprises and integrates SRT and CLT to offer a means through which the capacities and uses of these applications for enhancing the retention of words can be evaluated comparatively while considering the implications for the learners' working memory. Therefore, this study explores how and to



what extent Duolingo's skillful gamification adaptive strategies and Babbel, a context-based, space repetition-based approach, prove beneficial and where they are lacking in terms of the application of space repetition in language learning technologies.

Research Methodology

This study uses a content analysis method to analyze students' relative beliefs regarding vocabulary learning features in Duolingo and Babbel applications. Reviews were scraped from the Google Play Store using the ScrapeStorm tool, filtering a broad range of reviews for generalization. Preprocessing of the dataset was done in OpenRefine to refine the data by eliminating redundancy and noise, irrelevant records, and inconsistencies, but kept important topics like repetition, effectiveness engagement, cognitive load, and context of learning.190 reviews of each app were collected and only the opinions of users who have used the applications for at least three months were considered to confirm the uniqueness of the researchers' contribution by relying on feedback from experienced learners.

Data Analysis

To analyze the user reviews for patterns, the study used a thematic approach of analysis following the Spaced Repetition Theory (SRT) advanced by Ebbinghaus in 1885 and the Cognitive Load Theory (CLT) by Sweller (1988) as a framework. Using NVivo software, compiled reviews were systematically coded, and data visualizations, including word frequencies, clusters, and networks crafted. These graphical representations made it easy since patterns and relationships and differences between various themes could be easily compared and pointed out. The comparative analysis assesses the differences between Duolingo's adaptive gamified repetition and Babbel's structured, context-based repetition. Frequency analysis will quantify key terms related to spaced repetition and cognitive load, providing deeper insights into the learning experience.

Results and Discussion

User Perceptions of Vocabulary Learning Features in Duolingo

Duolingo is most famous for its vocabulary learning capabilities that can repeat knowledge in several ways and with varying intervals. Specific user feedback points to frequent latent semantic categories like "language", "learning", "lesson", and "practice", suggesting that learners use the app to refresh its primary mission of widening and strengthening their vocabulary. The learning strategy of Duolingo also includes the use of structured review, and these structures have aspects of spaced repetition theory in that they use repetition of concepts at certain intervals. Customers are generally receptive to these kinds of features, but the feedback also shows that there is potential for more effective implementation of these features.

Figure 1



Terms such as "double times" and "mode" apply to the discourse created concerning how Duolingo sets up its review system. These suggest that despite the nice feature of spacing repetition working in the background of the app, some of the modes appear to be restricted and unsuitable for individual learning preferences. For instance, one improvement that would increase Duolingo's flexibility is the ability to set individual repetition intervals that learners have over their repetitions. In this part, 'tool' and 'app' also answer that the users rely on Duolingo as a technology input, which helps them to practice vocabulary daily. However, what is lacking mainly is clear information about such advantages of spaced repetition, which seems to be a missed opportunity. Incorporating graphics on how spaced intervals enhance memory retention, illustrated on a timeline type of structure or as weekly or monthly alerts for the contents of previous weeks or months, could assist the users to feel more in charge of the process.

From the point of view of cognitive load theory, it seems that the Duolingo lesson organizers do not overburden learners with cognitive loads, as the vocabulary tasks are divided into small fragments. Comments regarding the app as developing lessons, sentences, and learning make it clear that people appreciate that the app breaks its content into easily affordable approximations. Such segmentation also minimizes intrinsic cognitive load, therefore helping the learners to assimilate the knowledge being imparted to them in each knowledge domain without necessarily getting overwhelmed. However, there are features, for example, the so-called 'hearts' system that penalizes the users for mistakes, which may increase extraneous cognitive load. As for the terms like 'obvious cheating' and 'structure', feedback indicates that these punitive aspects might add extraneous pressure and transform comprehension into the avoidance of penalty.

Figure 2

Doulingo Word Cloud



This study establishes that Duolingo complements meaningful learning tasks that meet germane cognitive load principles. A concept like "practice" and "lessons" shows how the app facilitates the utilization of concepts already learned. They are important for final vocabulary learning and for encouraging substantive mental engagement. To build on these features, Duolingo could add more contextual learning, like sentence construction, where one is presented with a conversational situation, or part of one, in which they must construct a string of words on the application with the selected vocabulary.

Though Duolingo is effective in utilizing gamified learning to maintain users' interest in vocabulary learning, it has several aspects that could be refined. By offering an even stronger commitment to spaced repetition, by eliminating cognitive loads such as the "hearts" system, and by improving actual practice



through practical applications, Duolingo has the chance to approach the user needs more effectively, thus optimizing the vocabulary acquisition process.

User Perceptions of Vocabulary Learning Features in Babbel

Babbel has positioned it as a language learning service, where a significant focus is put on the provision of build-up vocabulary exercises. This approach would commendably interest users in spaced repetition principles while supplementing Babbel's design to do the same. Indeed, terms like 'learning,' 'lesson,' 'good course,' and 'practice' underscore the sequential, well-structured learning model, which helps to revisit the vocabulary learned. Self-implementing consistent exercises is something adopted at Babbel and serves to ensure that users hone and maintain their vocabulary knowledge in the long term. The term "practice" indicates users' awareness of these tasks as part of their learning process and adoption of the principles of spaced repetition.

Users also speak of what they call "time" and "sessions," which might mean the duration and frequency of study sessions. Indeed, spaced repetition support is implied in these reviews based on Babbel's capability to schedule repetition fractions clearly or use adaptive intervals. At the same time, the lack of more flexible approaches towards setting these intervals can be viewed as evidence of the scarcity of opportunities to address the learners' variability. Additional keywords like 'renewal' and 'method' also underline how Babbel re-visits old content, which is a process involved in spaced repetition. The existence of those terms implies that Babbel includes cues or procedures that guarantee users actively study material previously taught to them, with repetitions at the correct time.

Figure 3

Babbel Word Cloud



Comprehensively, Babbel seems to meet the requirements of intrinsic, extraneous, and germane cognitive load that is required in learning vocabulary. The words 'grammar', 'language', and 'lessons', which keep on repeating themselves in the title, tell us that Babbel lowers the intrinsic cognitive load in a way that teaches complicated grammatical concepts in easily memorable chunks. Users also describe it as a 'good course' that is 'structured'; this also shows that the intrinsic load in Babbel is well managed, as the app provides organization and a logical flow of content.



On the other hand, the extraneous cognitive load is reduced in Babbel by the easy and simple design of the company's main product. Such words as 'approach', 'support', and 'structured' depict the users' confidence about the system established by Babbel, starting from the direction followed by the website, plus the teaching method it uses. All these aspects make it easy for the users to focus more on learning the appropriate vocabulary without being distracted in the process, since the company's focus is to ensure the users get the best out of its services. Thus, some measures like 'live classes' add an interactive dimension to them, which may either decrease or increase the repertoire of extraneous load. If these classes are integrated, they may improve understanding and decrease effort; however, because of unclear instructions or technical issues, extra cognitive load may be put on the learner.

Babbel also enhances germane cognitive load by only engaging students in meaningful ways with vocabulary tasks. Words like 'practice', 'process', and 'reviews' suggest that users see Babbel's exercises as engaging and close to real life. This implies the kind of offer of grammar exercises, sentence construction, and other kinds of activities which guarantee that the learner gains the maximal depth of knowledge processing and application, which also implies improvement of vocabulary.

It is understood that usability features such as the learn module names convey primary sentiments of Babbel's learning process: "learning, lessons, and practice". This agrees with spaced repetition theory, where the learners prefer the systematic arrangements of tasks that strengthen language acquisition. Similarly, such themes as "grammar," "method," and "renewal" indicate that Babbel provides subscribers with handy tools to retune their language skill basics and does not confuse them with excessive material. The procedural approach creates mental organization, thus enabling easy understanding, while support like live classes can be helpful or interfere with learning based on their provision.

Babbel must develop its spaced repetition systems further by adding diagrams or other elements that would show when and why students should review some information. Such tools would make the advantages of spaced repetition more transparent; they would encourage users to stick to their schedules. Furthermore, it would be useful to allow adjusting repetition intervals, which might fit the learning speed and inclination range of users. To minimize other problematic forms of cognitive load, Babbel might decide to reduce the amount of complexity in interface design and ensure that all the instructional features that engage learners, such as live classes, are easily accessible and free of mediating apparatuses. Last, increasing the number and variety of other effective, authentic uses of identified L2 words and phrases in conversations or grammar-in-use tasks would enhance the effective use and retention of the vocabulary. Due to the direct and meaningful words' repetition, together with their structural aspect reflected in Babbel, the tool deserves to be considered useful for language acquisition. By paying attention to the user complaints about flexibility, design, and attraction, Babbel has an excellent chance to optimize its



compliance with both the implementation of spaced repetition and the level of cognitive load, making learning even more effective.

Comprehensive Comparative Analysis of Duolingo and Babbel Reviews: User Perceptions of Vocabulary Learning Features

Duolingo and Babbel are two popular applications for learning foreign languages that differ not only in their approach to the use of vocabulary. This study evaluates user perceptions of these apps, focusing on their efficiency and constraints based on Spaced Repetition Theory as well as Cognitive Load Theory. Each of the two apps uses some form of spacing, which means that the learner comes across the material to be learned at intervals to retain it, though the approaches taken by each application are quite different.

All of the vocabulary learning features in Duolingo are highly gamified, and all of the keywords that were chosen to contain such terms as 'streak,' 'hearts,' 'learning,' and 'every day.' Some of the aspects include the user's need to practice daily through mechanics like feature streaks and gaining points, all of which are related to spaced repetition. However, the "hearts" system imposes a penalty for mistakes that could interrupt the user's progress, and it may disengage those who have difficulties performing certain tasks. However, the simplicity of the concepts explained with the help of the games that create engagement, marked by such words as "fun" and "easy," might not be very helpful when it comes to real instruction and the development of necessary skills to remember the meaning of complicated words. While this approach is fun and appealing to the typical casual learner, it may not promote continuous practice due to the structure it imposes.

Figure 5

Duolingo and Babbel Word Frequency Tree



However, Babbel is more formal in approach and draws from the academic way of teaching with a focus on vocabulary. User feedback contains words like "grammar, method, renewal, and practice," relates it to systematic lesson planning and the repetition of core points. Compared to Duolingo, Babbel is much more direct with spaced repetition by reminding the learners to go back to the material for more purposeful review, and thus more useful for vocabulary. However, this way of learning guarantees the achievement of good results, but at the same time, the excitement is much less than in the case with Duolingo's games. This could also potentially make Babbel less attractive to users who like the idea of learning in a less traditional method.

In the case of both apps, the researcher proposed to develop their app in a manner that is coherent with the Concept of Cognitive Load Theory as it relates to intrinsic, extraneous, and germane cognitive

loads. Duolingo has designed its vocabulary lessons in a way that minimizes the content of each lesson to a level where the intrinsic load is minimal, which is why the content does not appear difficult. Nevertheless, conceptual and perceptual interference can arise from its "hearts" system and the streak mechanics, which lead to extraneous cognitive load and deal with unnecessary stress, while users may overemphasize the penalty rules rather than memorizing the English words. On the other hand, due to the systematic way of presentation of information, fewer confounding factors are presented, and less focus is given to grammar, which necessarily makes understanding of the language's rules a lesser intrinsic load.

Figure 6

Duolingo and Babbel Cluster Analysis



As for the germane load, Duolingo offers media that entails skillful practice with the subject matter, including vocabulary practice games. These features help drive utilitarian memory use in learners by helping them to not only review but also practice applying what they have learnt. As for the germane load, Babbel sharpens the focus on practice with grammar exercises and real-life phrases so that users gain valuable understanding from the practice. This type of interaction also benefits Babbel most significantly among learners who are interested in mastering an extensive number of details about the structures and meanings of words. It's clear design and methodical progress also minimize extraneous cognitive load, allowing learners to focus on their studies without distractions.

Subsequent word frequency queries, cluster analyses, bubble plots as well and network diagrams also emphasize the differences between user perceptions. Some of the work clusters found in Duolingo include gamification, casualness, and simplicity, meaning that it attracts learners who do not have much time to learn. Yet, it divides the information into many spheres, and although the spheres are relevant, it may be too much for users craving step-by-step knowledge enhancement. Importantly, Babbel demonstrates a closer proximity of words to the x-axis at the extremes of the graph, while featuring concentration in preparing and using themes with clear clusters around "grammar" and "method." Its network is less extensive and serves to underline that it offers pure, comprehensible lessons on vocabulary; it is useful to those learners who appreciate more specialization and fewer gimmicks.

However, it is notable that both applications perform differently but are outstanding in the specified areas. Duolingo's interactive elements effectively educate users on vocabulary, although its structure would be improved by increased complexity in the game. Keeping it academically sound, Babbel has a well-established structure of classes that guarantees the effectiveness of the learning process, but the use of some light gamification elements could improve the interest of the classes without distorting the method. If these areas are addressed by the apps, it is possible to bring about improvements, thus creating an optimal vocabulary learning platform.

Figure 7

Doulingo and Babbel Thematic Comparison



Conclusion

This study is a comparative exploration of the methods and the users' attitudes towards Duolingo and Babbel's vocabulary learning features by using the Spaced Repetition Theory (Ebbinghaus,1885) and Cognitive Load Theory (Sweller, <u>1988</u>) models. Duolingo does a very good job with its streaks, its rewards, and its overall playful feel. Its strategy on spacing quite positively influences spacing's ability to encourage consistent practice, especially among casual learners. However, referencing punitive mechanics, like "hearts," disengages learners from attempting to figure out challenges by raising the extraneous cognitive load. Duolingo reduces intrinsic load by breaking complex content into small pieces; however, at the same

time, its structure is less clear-cut and less guided, provoking excessive cognitive load in those who will cancel out in search of organized vocabulary learning.

Babbel, on the other hand, is much more formal and systematic, and it uses grammar and real-life examples. Its application of spaced repetition through content update disposition provides guaranteed long-term recall, which makes it appropriate for students who prefer academic intensity and escalation. In this case, Babbel successfully reduces both the germane and the extraneous cognitive loads, providing for a smooth and well-directed learning process. However, this has no gaming features that sort of make the learning process more fun and interesting for the user.

Altogether, Duolingo is ideal for learners who just want to have fun and repeatedly revise the vocabulary in English, while Babbel would be suitable for learners who want to follow the English courses step by step, following the academic credits. The idea of merging the best of both apps, Duolingo's gamified approach and Babbel's systematic approach, can create an easily enjoyable as well as comprehensive vocabulary learning application. The findings of this research suggest that the design of learning activities can be more congruent with users' wants and needs, and the future development of foreign language learning interventions. Ethical concerns made it possible to work solely with data that was public and anonymized to avoid compromising an individual's identity. Criticisms, including the rater bias of the user reviews and that they are restricted to specific platforms, have also been noted. Applying Cognitive Load Theory, this research seeks to establish how aspects of the design and delivery of spaced repetition features impact learners' practical ability to retain and recall vocabulary effectively and provide LDs for enhancing Mobile-Assisted Language Learning technologies.



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