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Factors Affecting Vietnamese University Students' Choice of Online Tools for English Vocabulary Acquisition*

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ABSTRACT

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This research study examines the factors affecting Vietnamese university students' choice of online tools that are used for learning English vocabulary. Focusing on intermediate third-year students at a university in the Mekong Delta of Vietnam, the study explored the preferences for specific online tool features among students of English, Information Technology, and Business and the primary reasons behind their selection of the tools. Using a mixed-methods approach that incorporates surveys, semi-structured interviews, and an AI technique of Random Forest Classifier, the study identified the significant factors that students often considered when selecting their preferred tools. The results showed that students gravitated toward media platforms and their availability over dedicated vocabulary learning apps, and the selected tools should have features of flexibility, gamification, audio, and visual aids for vocabulary learning and retention. Uncovering the features students value for vocabulary acquisition provides key insights for educators, technology developers, and curriculum designers to optimize students' experience in learning English vocabulary.

KEYWORDS

vocabulary acquisition, influencing factors, online tool preference, Vietnamese students of English, Random Forest

1. Introduction

Expanding vocabulary is crucial for learners of English as a foreign or second language (EFL or ESL) as it helps them become more proficient in the language overall (Harmer and Thornbury 2012). Vocabulary expansion fosters effective oral and written communication in a variety of professional contexts in addition to increasing learners' motivation. In addition, how students use language is critically important to good vocabulary acquisition and retention, underscoring the value of deliberate and methodical vocabulary learning strategies (Fengyu 2023).

Traditional vocabulary-learning technique such as repetition and rehearsal drills (Crothers and Suppes 1967) and mnemonics and memory aids (Atkinson and Raugh 1975) have been widely employed. However, they often fail to give learners a deep understanding of the intricate relationships and subtle distinctions that underpin a truly functional lexicon (Bardel 2013, Meara 1980)

Despite the advanced development of teaching methods, students still have to overcome some complexities when learning vocabulary: difficulties in memorization (Schmitt 2005) and lack of motivation for active vocabulary retention (Nation 2001). Besides that, traditional ways of learning do not allow students to develop the ability to use vocabulary effectively in real-life communication (Krashen 1981). In other words, most of them have fallen short in terms of providing features that meet students' needs for learning vocabulary during their progress, which leads to limitations that hinder the effective acquisition and usage of vocabulary.

The development of technology has brought significant convenience to student learning. The literature shows there have been extensive studies regarding the use of technology and leverage of technological tools to facilitate students' lexical learning in English. Wahid et al. (2023) examine the effectiveness of online resources in enhancing English language learning, considering both their opportunities and challenges. Their findings show that students frequently use online resources, recognizing the important role of technology in accessing digital learning materials. This change is particularly seen in the domain of learning English vocabulary, where traditional methods are being supplemented by technological tools, as evidenced from Yu and Trainin (2021), who found that technology-assisted vocabulary learning is generally more effective than traditional methods. Their research highlighted that effectiveness increases when the target language is similar to the learner's native tongue and that learning via mobile devices was more effective than on computers.

Narrowing the focus to practical applications, Wang et al. (2021) systematically reviewed popular vocabulary apps in China. They found that these apps primarily help students develop word knowledge by providing translations into the native language and presenting vocabulary through multimodal formats like text-plus-image and text-plus-image-plus-audio, often accompanied by sentence examples (p.251). These offer students a range of tool options serving their individual needs (Kayra 2024). Prior research studies (Davie and Hilber 2015, Lu 2008) have shown that various online tools help students improve retention of new vocabulary, exhibit positive attitudes, and express higher levels of motivation in learning English.

While previous studies have identified promising technologies language learning (Warschauer and Meskill 2000), they primarily rely on established methods and conventional research tools, such as questionnaires and interviews. These studies have not been able to take full advantage of AI techniques in identifying the key feature importance or clarify the most significant factor in students' choices of online tools. Besides, there is a lack of research studies specifically investigating what factors may affect the choice of online lexical acquisition tools for Vietnamese students in Mekong Delta areas. Therefore, this study aims to examine the perspectives of Vietnamese learners of English toward using digital tools for vocabulary acquisition. In other words, the study investigates the factors influencing the choice of tools with specific features most valued by addressing the two following research questions:

1) What are the primary factors affecting Vietnamese university students' selection of online tools for English vocabulary acquisition?
2) What is the relationship between students' academic performance in English and their use of online English vocabulary tools?

2. Literature Review

2.1 Technology-Enhanced Vocabulary Learning

Technological advancements have significantly transformed vocabulary learning practices, offering students a wide range of digital tools that are tailored to their individual learning needs (Teymouri 2024). These tools enable access to diverse learning resources, customized learning experiences, and immediate feedback, all of which contribute to improved engagement and learning outcomes (Guaqueta and Castro-Garces 2018, Wang et al. 2021).

Research has highlighted the key factors that influence students' selection of digital tools: perceived usefulness, ease of access, usability, and impact on academic performance (Akpen et al. 2024, Polyzi and Moussiades 2023). These factors are directly in line with our first research question. Learners are more likely to adopt tools that are user-friendly, engaging, and effective when the tools help them remember and apply new vocabulary in real-life contexts (Fabián and Rosario 2023, Slade and Prinsloo 2013). Additionally, autonomy and personalization—such as choosing preferred learning modes or adjusting levels of difficulty—have been shown to increase motivation for self-study (Chen et al. 2019, Teymouri 2024).

Of the most extensively studied tools are *Quizlet, Memrise*, and *Anki*. These online platforms use gamified features and spaced repetition to enhance vocabulary retention. For instance, *Quizlet*'s flashcards and interactive quizzes have been widely credited with improving motivation and recall (Çaparlar and Yünkül 2024, Chen et al. 2019, Setiawan and Wiedarti 2020). Similarly, *Memrise* and *Anki* offer multimedia content and customizable features that foster personalized and self-paced learning (Agnes and Srinivasan 2024, Nuralisah and Kareviati 2020, Rohim 2022). *Anki* even provided spaced repetition, which reminds the students of learning and remembering recently learned words, leading to making the students' learning more interesting (Agnes and Srinivasan 2024, Mujahidah et al. 2024).

Beyond the tool preference, studies have investigated how digital tool use relates to academic performance. Learners who frequently use vocabulary apps tend to show improvements in vocabulary knowledge and better results of the exams (Agnes and Srinivasan 2024, Majeed et al. 2023). However, most existing studies rely on traditional methods such as surveys and interviews, and few have applied advanced data analysis techniques—such as machine learning—to identify which tool-related factors primarily affecting the students' choice of tools that strongly predict their academic performance.

The research gap in methodology and geographic context at a university in the Mekong Delta of Vietnam shows the need for this present study, which uses both traditional statistical and analysis by advanced analysis technique in order to explore the factors affecting the students' choice of online vocabulary tools and the relationship between their preferences for the tools and the academic performance.

2.2 Factors Influencing Learner Choice of Online Tools

2.2.1 Tool availability

According to Nami (2019), one of the important factors influencing students' choice of vocabulary learning tools is availability and accessibility. These two factors are deliberately used interchangeably in our study, to refer to a unified concept that encompasses both the presence of learning resources and the ease of obtaining them. This approach is consistent with established research in educational technology where these terms are often seen as closely related aspects of the same construct. Following Nami (2019), we view tool availability/accessibility as a single factor (hereafter referred to as "availability").

The factor of tool availability encompasses several key considerations that students evaluate when selecting learning applications. Cost represents a critical barrier, as Bakia et al. (2012) found that students worry applications requiring high costs reduce their appeal, making them less likely to choose expensive options. Students show a clear preference for applications that support learning without requiring payment. Additionally, technical accessibility plays a vital role, with students valuing open access to the internet and considering connectivity requirements when choosing a tool (Golonka et al. 2012). The variety of learning content available within an application also influences the selection, as students believe diverse content options are essential factors in their decision-making process.

2.2.2 Tool usefulness

Beyond availability, the perceived utility and effectiveness of vocabulary learning tools significantly influence student adoption and continued use. Students' awareness of the concrete benefits that online tools provide directly correlates with increased mobile app usage in vocabulary learning contexts (Alzubi 2021, Chen et al. 2019, Warschauer and Meskill 2000). The specific features and functionalities offered by these tools have demonstrable positive impacts on learning outcomes, with students gravitating toward applications that effectively address their particular learning needs and requirements (Junco 2012). Research consistently demonstrates measurable improvements in academic performance when students integrate digital tools into their vocabulary learning processes. Studies have documented enhanced vocabulary retention, improved learning results, and overall academic performance gains among students who actively utilize digital vocabulary learning tools (Godwin-Jones 2011, Li and Ni 2016, Yu and Trainin 2021).

2.2.3 User-friendliness

Previous studies (Samrgandi 2021, Swan et al. 2008, Syamala et al. 2025) pointed that factors that positively influence students' choice of vocabulary learning tools are an attractive interface. The interface of an application and the way it presents itself determines whether students choose to use a mobile application (Godwin-Jones 2011, Samrgandi 2021). An interface that is interactive, visually stimulating, and provides clear guidance is more accessible and easier to follow, then students will encounter little, if not no obstacles during their learning process. This makes it a crucial factor in their adoption of learning tools (Nielsen 2012, Syamala et al. 2025, Samrgandi 2021).

2.2.4 Tool impact on academic performance

Prior studies (Akpen et al. 2024, Chen et al. 2019, Polyzi and Moussiades 2023) have found that online tools have significant potential in improving students' academic performance. Students who use online tools feel that their vocabulary learning has improved, and their language learning outcomes have also been enhanced through

the use of online tools (Fabián and Rosario 2023). In line with this, in the present study, the term "academic performance" refers to participants' self-reported perceptions of their achievement. While recognized that reliance on self-reported data may limit reliability due to discrepancy between perceptions and actual performance, this approach was chosen for its ability to reflect students' personal learning experiences and motivational factors.

2.2.5 Barriers of Tool Adoption

Students also face some obstacles during the process of using these tools. First, not all students have access to advanced technology for learning (Xodabande et al. 2022), highlighting the issue of the digital divide (Prensky 2001, Ragnedda and Muschert 2013). Then, the ability to catch up with the latest technological tools requires technological literacy, additional skills, and access (Puentedura 2006). More notably, online learning tools do not eliminate the risk of knowledge gaps due to misinformation encountered online (Haleem et al. 2022, Li and Ni 2016). Additionally, the online tools require the accessibility of students when students log in with personal details, raising questions about the safety of students' information (Chen and He 2013, Zulqadri et al. 2022).

2.2.6 Tool use

Despite facing some potential hindrances, online tools support students much more autonomy in learning. Students can reinforce their learning vocabulary through continued usage (Nation 2001). Daily learning of vocabulary on the tools, combined with reminders and spaced repetition, may lead to consolidated learning and improvement in long-term retention of the vocabulary learned (Cepeda et al. 2008). Additionally, online tools also engage students by integrating video game features, enabling them to learn through play, reducing stress and enhance motivation in their leaning vocabulary (Anderson 2011, Chen et al. 2019, Majeed et al. 2023). In addition, Hattie and Timperley (2007) point out that the immediate feedback provided on daily learning results helps students easily track their progress and improve their academic performance. Notably, online tools use diverse learning methods through flashcards, images, and videos. The application of these dynamic tools helps students retain information longer and prevents the learning process from becoming boring, thus maintaining motivation (Clark and Mayer 2023). Focusing on these factors can delve deeper into the specific characteristics of online tools that influence learner choice and provide valuable insights for educators and tool developers.

3. Method

3.1 Research Design

This research employed a mixed-methods approach, integrating both quantitative and qualitative techniques to explore the factors shaping the students' preferences of online tools for vocabulary learning. Specifically, the survey provided statistical insights, combined with the qualitative data from semi-structured interviews to complement the findings. Also, Random Forest Classifier - an AI tool, was used to identify usage patterns and tool choice determinants. This integrative approach ensured a comprehensive understanding of the research, allowing more specific details on measurable trends and personal insights, and yielding a more nuanced analysis of students' choices and the factors affecting their preferences of vocabulary learning tools.

To achieve the study purpose of detailed examination of students' preferences and insights that might be overlooked in larger samples, a small sample size of participants was selected. Recruitment was conducted in three

phases. First of all, a Google Forms link was sent to students across three university departments. Respondents were screened to include only active users of online vocabulary tools who also self-reported their intermediate English proficiency level. Secondly, from this preliminary group, participants were strategically selected to create a balanced distribution across academic majors and genders. Finally, the selected participants were confirmed based on their commitment and availability to ensure complete participation in the study's data collection activities.

3.2 Participants

A sample of 36 third-year students majoring in English, Business, and Information Technology was chosen for this study. They were recruited through purposive sampling, a method commonly used to select participants with specific characteristics relevant to the research aim (Patton 2002), for uniformity in learning context (Warschauer and Meskill 2000). First, the participants were enrolled in an English- medium academic programs at a private, non-profit university in the Mekong Delta of Vietnam. By their third-year, these students had developed academic knowledge and so they could engage with field-specific vocabulary. Their varied fields of study provide insights into how different academic backgrounds influence the adoption and effective use of vocabulary tools during a critical stage of their academic development. In addition, the selected participants demonstrated an English proficiency classified as intermediate level measured by the scores they had to achieve for the requirements of the English-medium academic programs at our university ("intermediate" level, according to the British Council, means achieving IELTS ≥ 5.0, TOEIC ≥ 550, or CEFR B1 or higher on current international standardized English tests). The sample consisted of 18 males and 18 females aged between 20 and 21 years, with intermediate level of proficiency in English. (In our study, the students had already reached this intermediate level before they participated in the survey). The demographic information of participants was summarized in Table 1.

Table 1. Participants' Demographic Information

		Number	Percent (%)
Gender	Male	18	50
	Female	18	50
Age	20-21 years old	36	100
Years of study	3	36	100
Major	English	12	33.3
	Business	12	33.3
	Information Technology	12	33.3
English proficiency	Intermediate	36	100

3.3 Data Instruments and Collection

A survey to examine perceptions of online vocabulary learning tools was administered via Google Forms. 36 participants were invited, and all the 36 submitted responses. Of these, 30 responses were received by the deadline, and six additional responses were submitted the day after. The six late responses were kept because they fell within the same data collection phase (the survey link remained active for contingency). Also, they met identical eligibility criteria**,** including the same course cohort and identical survey version. We used all the 36 responses for analysis to maximize statistical strength and representativeness.

The instrument contained 20 questions/statements, 18 of which were Likert- scale items with a range of *1* for *Strongly Disagree* to *5* for *Strongly Agree*, categorized into five constructs, namely (1) Tool Usefulness (6 statements) include Statements 1, 2, 3, 4, 9, and 16, expressing the diverse learning methods and learning time

efficiency, (2) Tool Impact on Academic Performance (6 statements) consists of Statements 5, 13, 14, 15, 17, and 18, generally denoting the enhancement of self-directed learning and improvement of the learning outcomes, (3) Barriers to Tool Adoption (3 statements), (4) User-Friendliness (Statement 7), and (5) Tool Availability (Statement 8), compared to the tool usage. It is worth noting that Tool Accessibility included cost-related concerns, such as whether the tool was used for free of charge or required payment. This is in line with previous studies (e.g., Bakia et al. 2012).

The other two additional open-ended statements (Statements 19 and 20) identified tool discovery sources and specific tools used, respectively. These constructs were selected to evaluate factors influencing the students' selection of tools and relationships between tool usage and their academic results. The data also involved follow-up interviews with 12 out of the 36 participants (with 4 representatives for each major) to gain further insights into their perceptions regarding the impact of design and user interface features of online tools influencing the decision to use the tools for vocabulary acquisition. This resonates with the works of Syamala et al. (2025) and Samrgandi (2021), who identified design and user interface as a fundamental driver of student acceptance of digital tools.

3.4 Data Processing and Analysis

This study employed a mixed-methods approach, combining quantitative survey data with qualitative interview data. The quantitative data, collected from 36 participants via a Google Forms survey of 20 questions was used for descriptive statistics to calculate the contribution of individual variables, namely usefulness, user-friendliness, accessibility, academic performance improvement, and barriers.

To explore potential associations between these factors and students' academic performance, Pearson correlation analysis was used. This method allowed us to examine the strength and direction of linear relationships among the factors. However, Pearson correlation does not capture non-linear patterns or interaction effects. To model these potential non-linear relationships and interaction effects among predictors, we implemented Random Forest Classification, a well-established supervised machine learning algorithm (Breiman 2001). The Random Forest Classification algorithm builds multiple decision trees using randomly selected subsets of data and features. The final prediction is determined by aggregating the results from all the trees through reducing overfitting (when a model learns training data too well, including noise and patterns that do not generalize, leading to poor performance on new, unseen data (Ying 2019), hence, improving predictive accuracy. The key output of the Random Forest model is Feature Importance, a measure that indicates the relative contribution of each input factor in predicting the target outcomes (e.g., the students' choice to use online vocabulary tools). This is calculated automatically through the model's internal metric, therefore, offering a data-driven and highly reliable indication of the most influential factor (referred to as the "impact factor"). Overall, this ensemble learning method minimizes overfitting while providing metrics of feature importance.

Finally, qualitative data from follow-up semi-structured interviews with 12 participants were transcribed and thematically analyzed. The analysis focused on how specific design features influenced tool selection and the perceived connection between students' academic performance and use of specific online vocabulary learning tools (see Appendix for transcripts).

4. Results and Discussion

4.1 Results

4.1.1 General description

The results of the study shown in the bar charts illustrate the various factors that influence college students' choices when selecting online tools for vocabulary learning (Figure 1). From the survey responses, factors such as accessibility, perceived improvement, usefulness, and ease of use emerged as important. These factors suggest that students prioritize practical and supportive features of online tools, valuing platforms that enhance their learning experience and academic achievement. The quantitative analysis showed a strong positive correlation between tool availability and usefulness and students' self-reported academic performance.

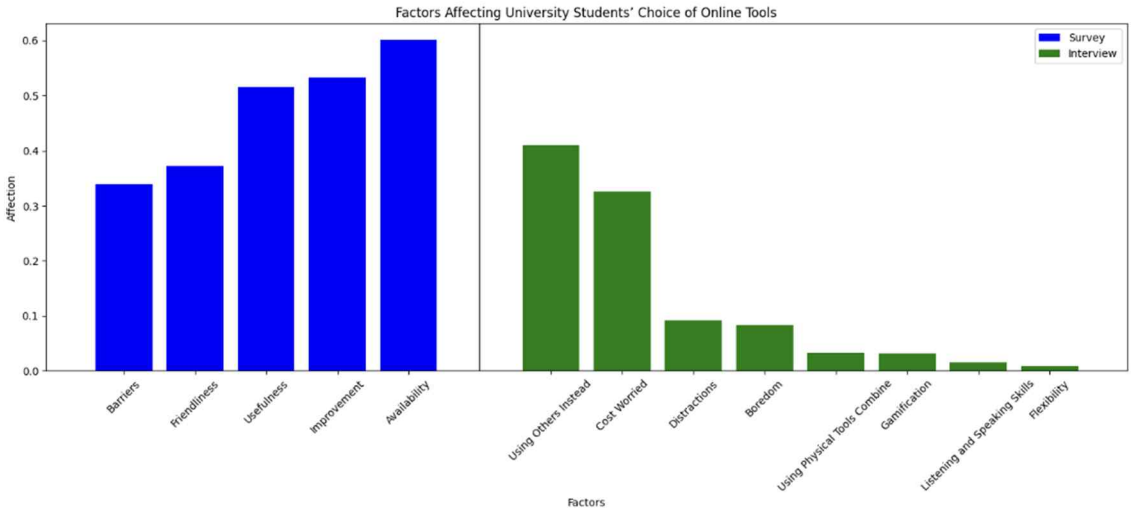

Figure 1. Student Preferences for Online Tools

The Random Forest Classification results identified availability as the strongest predictor of students' tool selection. The responses of the participants suggest that "availability" was often interpreted to include cost, that means, whether the tool is readily available, minimally affordable, or even free of charge. These quantitative findings align with the qualitative themes in that the participants frequently highlighted the importance of tool availability and usefulness.

4.1.2 Results of key variables

Availability

Availability is among the key factors influencing students' choice of vocabulary learning tools (Nami 2019). As noted by Bakia et al. (2012), cost, in particular, can be a significant barrier, preventing the students from accessing high-cost tools with desirable features. Our survey measured this aspect using Likert-scale questions (1-5), revealing that nearly 45% of respondents viewed online tools positively—the highest percentage among all tested variables. Qualitative data supported this finding, as participants indicated a higher likelihood of adopting tools when they were easily accessible and readily available. Therefore, tool cost, as a salient aspect of tool availability, significantly influenced the students' preference for certain tools over others.

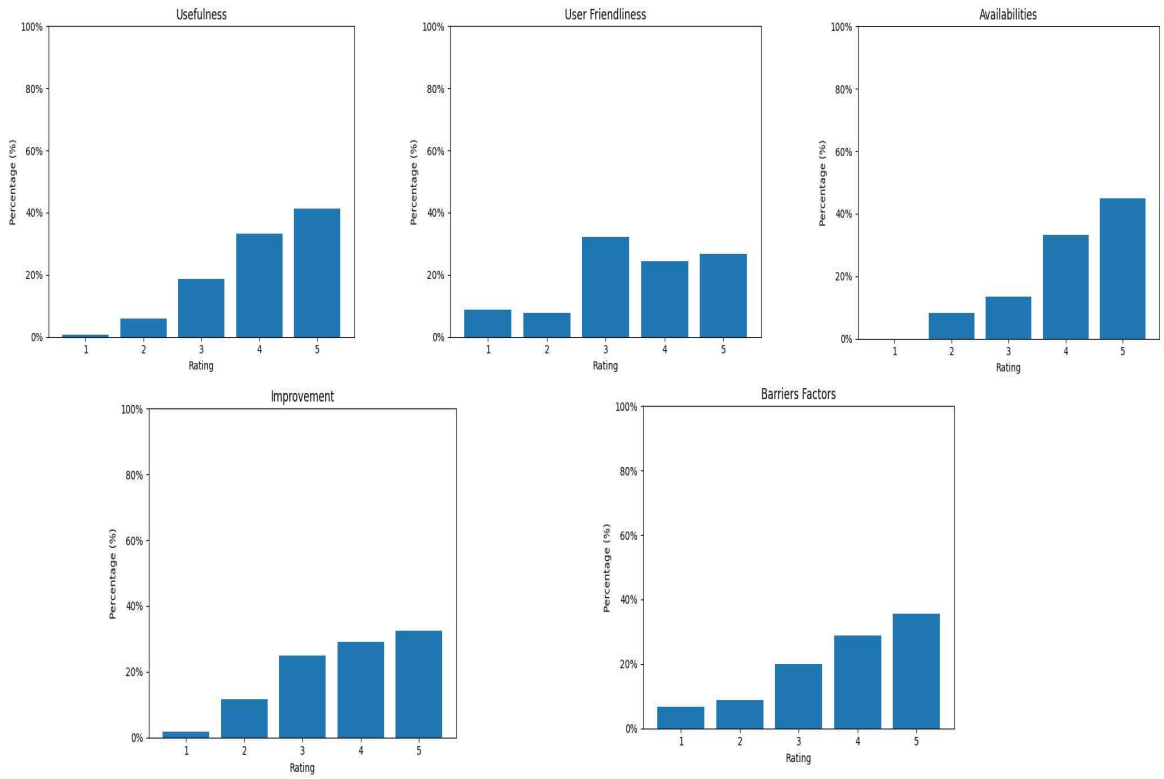

Figure 2. Distribution of the Key Variables

Usefulness

Referred to as the degree to which students believe online tools can enhance their learning experience and academic performance (Akpen et al. 2024, Chen et al. 2019), particularly promote more frequent use of mobile apps in vocabulary learning (Alzubi 2021, Chen et al. 2019). Our survey measured this aspect through Likert-scale questions, and the results revealed that a significant majority viewed online tools positively, with more than 40%. The results were backed up by the qualitative data in that students tended to use the tools more frequently if they found it useful. The findings align with existing literature on the usefulness of online tools in learning English vocabulary.

User-Friendliness

User-friendliness of online tools affects how likely students are to include them into daily life and study. According to Nielsen (2012) and Syamala et al. (2025), students are more likely to use tools when clear guidance is accessible and easy to follow. Our survey measured perceived user-friendliness using a 1-5 Likert scale. The results showed that the most common response was level 3 accounting for 35%, while level 5 received the second highest frequency at 30% of responses. The data from the interviews showed that a majority of study participants indicated a preference for the selection of tools with flexible designs, user-friendly interfaces, and ready availability.

Academic Improvement

The quantitative data revealed a strong positive correlation between the use of online tools and vocabulary

learning improvement. Students who used online tools least frequently (level 1) tended to have lower academic performance, while more frequent use was associated with higher learning outcomes (Figure 2). Similarly, almost all interview participants believed that frequent engagement with online tools contributed to better academic performance. The findings were consistent with the existing literature on the topic (Akpen et al. 2024, Chen et al. 2019, Fabián and Rosario 2023, Polyzi and Moussiades 2023).

Barriers

Analysis thematically reveals that a significant proportion of students reported challenges in using tools. Quantitatively, around two-thirds of the participants rated their difficulties at the upper end of our scale. Besides common barriers, including confusion on choosing the right tools (Xodabande et al. 2022), safety of their information (Chen and He 2013, Zulqadri et al. 2022), complicated registration (Puentedura 2006), or uneven access among students (Prensky 2001, Ragnedda and Muschert 2013), our study identified cost to be the most critical barrier, preventing students from accessing the tools with higher, more desirable features.

4.1.3 Impact factor

The Pearson correlation analysis revealed significant relationships between the independent variables and student selection of online tools, specifically availability (r = 0.8, p < 0.01), usefulness (r = 0.63, p < 0.01), frequency (r = 0.63, p < 0.01), improvement (r = 0.7, p < 0.01), and familiarity (r = 0.32, p < 0.01).

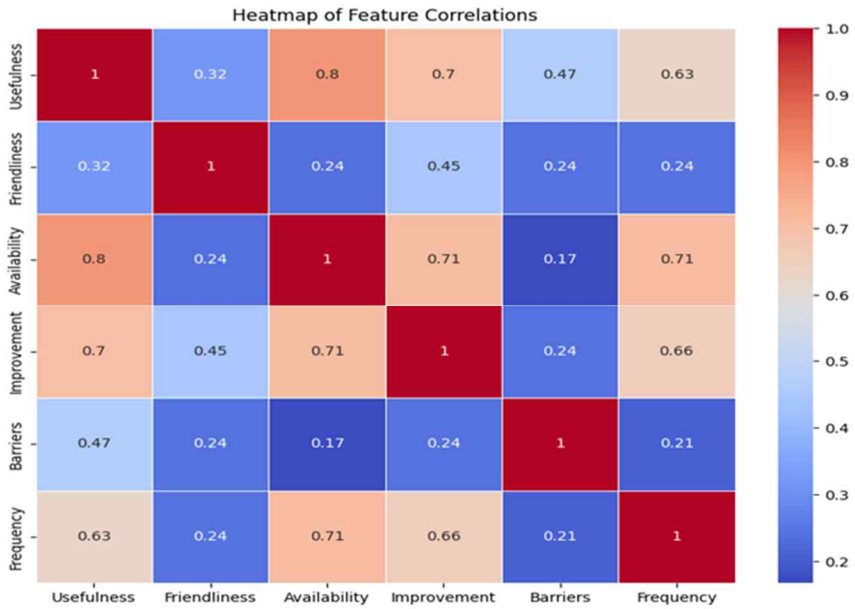

Figure 3. Pearson Correlation Between Variables and Selection of Tools

Barriers were expected to negatively correlate with tools, and the results suggested a corresponding correlation (r = 0.47, p < 0.01), indicating that students are reluctant to use tools if issues are related to cost. Notably, strong positive correlations were found between availability, usefulness, frequency of use, and learning improvement, suggesting that higher tool usage leads to better academic performance. All these factors were positively associated with tool usage (Figure 2). Besides, to validate these findings, we employed Random Forest Classifier, an AI tool.

The results of the Random Forest confirmed the factors influencing student selection of vocabulary-learning tools. The availability of the tools emerged as the most critical factor, with an importance score of 0.34 (Figure 4).

4.2 Discussion

4.2.1 Factors affecting students' selection of online tools for vocabulary acquisition

4.2.1.1 Feature importance of factors affecting the students' choice of online vocabulary tools

The study results showed that the top three factors influencing students' choice of online tools include avalability, improved academic performance, and usefulness of tools at issue. Availability showed the ability for students when using online tools to access anywhere, anytime. Academic Improvement highlighted the benefits online tools bring for students; students using the tools can enhance their results. Usefulness emphasizes the tendency of students when selecting online tools; students tend to use the tools that provide diverse learning materials or even quick assessments.

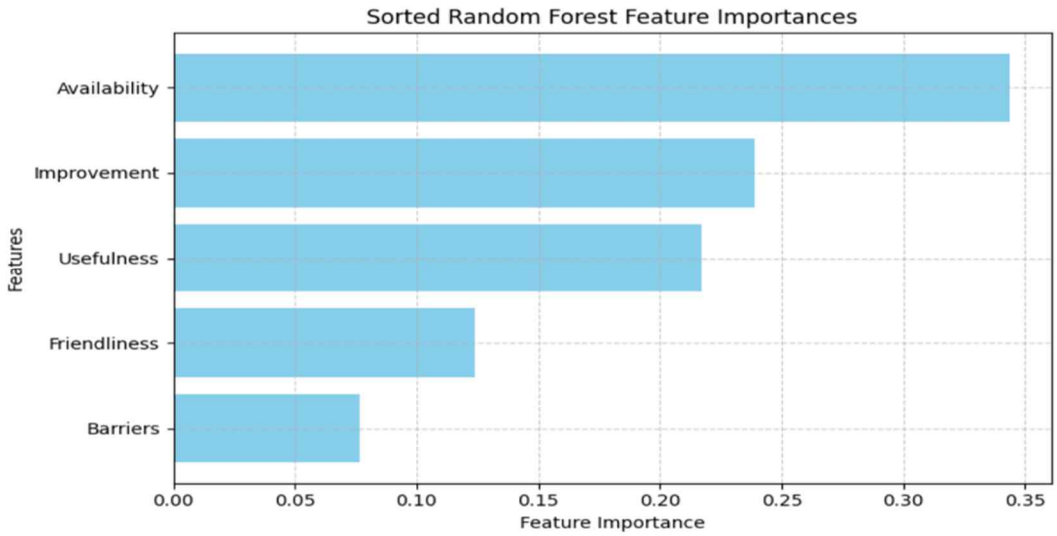

Figure 4. **Random Forest Insights: Sorted Feature Importance for Tool Effectiveness**

Students choose online tool options for vocabulary learning by availability (0.34), academic performance (0.24), and usefulness (0.22) (Figure 4). These features show that students tend to choose platforms that are not only widely available but also beneficial in understanding the lesson they engage in. Since the online tools provide more practice ways and feature practical help, students have more chances to learn vocabulary.

Availability has a high relative influence. According to the results of this present study, 75% of students prefer tools that combine resource libraries with flexible accessibility features, allowing learning from anywhere at any time. The second most important influence on student is academic performance. Many students believe that online tools support vocabulary acquisition by offering engaging, interactive, and multimodal practice through online games, videos, audios, and annotations, which in turn contributes to more successful language learning outcomes.

Interestingly, they make sense as the selection rates among respondents are low for friendliness (0.13) and barriers (0.05), suggesting that those transition factors do not affect students' choices. User-friendliness and

perceived barriers factors which students to have a lower selection rate among respondents. Students do face some obstacles while using online tools but tend to overlook them as long as the tools provide important features like accessibility, better academic performance, or even usefulness.

Students are more motivated to learn, and the traditional vocabulary learning process is now approached and transformed through more modern and engaging methods. Klimova and Polakova (2020) found that students highly valued the convenience and easy accessibility of mobile apps for vocabulary learning. They noted that technological development increased the frequency of smartphone use for studying, making these tools more common and popular.

The research findings on the main factors influencing students' choice of vocabulary study tools are consistent with previous studies. Wang (2017) notes that the major concerns of students when choosing mobile applications for vocabulary study are convenience and accessibility. Nami (2019) finds that cost is an important factor that could prevent students from using some of these apps. Prior studies (Lei et al. 2022, Okumuş Dağdeler 2023) point out that since technological advances have resulted in broad internet access, distraction can have a negative effect on students' level of concentration and in how they use mobile apps for vocabulary study.

4.2.1.2 Other concerns of the tools

Students' preferences in online tools for vocabulary learning are, therefore, primarily driven by the resources' availability and their potential to contribute to academic success, underscoring the value of accessible, performance-oriented tools in language learning.

Based on the survey results, we outlined ten technical factors influencing students' choices when it comes to selecting a suitable vocabulary learning application. First and foremost, it is the preference for alternative platforms over specific applications; coming next is cost constraints; distractions and boredom come quite close; and other concerns like integration with physical learning tools, gamification features, listening and speaking skills support, and flexibility are not significant.

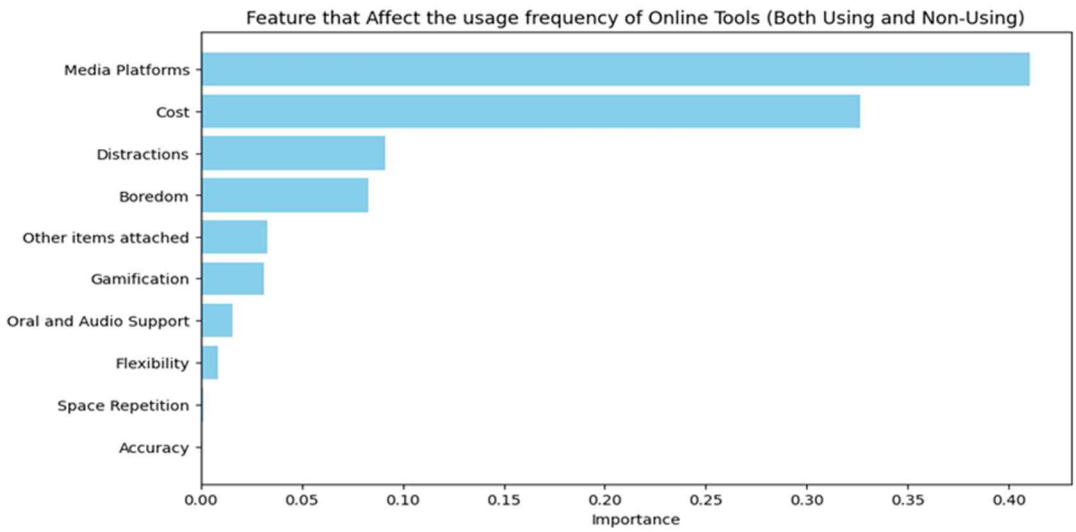

Figure 5. Random Forest Analysis: Unveiling Other Concerns of the Tools

The leading factor, which had to do with students who preferred media platforms over dedicated learning apps, which correlated with a score of 0.40 (Figure 5). It could mean that the tendency may be toward students' preferences for platforms offering a wide variety of resources or features beyond those typical in vocabulary-specific apps as well as learning experience entailed. The student preferences of online platforms include their friendly interfaces, cost-effectiveness, and topic-diverse vocabulary rather than apps just focusing on vocabulary acquisition, aligning with Smith & Johnson's (2020) study. This finding was supported by the qualitative data in that students tend to use other media platforms. For example, one participant (CB02E) said, "*I think if I haven't used online tools for my vocabulary learning, maybe I will choose another alternative for study vocabulary*". Alternatively, NT19B and NT27I gave the same answer, "*I think watching videos will help learn English well",* and *"Reading book[s] is my alternative because there are many vocabulary words in it*."

However, the cost factor took the second most influential position with a score of 0.33. The students expressed a preference for free or low-cost tools, indicating that budget considerations play a role in their decisions. This was reflected by three out of twelve interviewees—CB02E, DA04E, and NL25I expressing their concerns of the high fee. They believed that the high cost limits accessibility for many students, making it difficult for them to consistently use the online tools for vocabulary learning. Some also mentioned that more affordable or free alternatives would be preferable. This result supports the findings of prior studies (e.g., Bakia et al. 2012) that cost is a key barrier within the concept of tool availability. Although tool cost was not originally presented as a standalone or separate factor, it emerged prominently in student responses. This confirms the impact on how the students perceive availability and then choose the "right" tools for use.

Another influencing factor is the potential for distraction factor ranking third at 0.09. Students noted that vocabulary apps could lead to distractions, perhaps due to notifications, ads, or lack of focus-oriented design. Fourth, students reported that some apps fail to maintain their interest, which may reduce sustained usage. This score (0.08) suggests that engagement features are less influential but still relevant to students' experiences. The remaining factors, including combining apps with physical tools (0.03), gamification (0.03), listening and speaking support (0.01), and flexibility (0.008), were less influential. These low scores indicate that while some students appreciate additional features like gamification or flexibility, these aspects are not primary drivers in their choice of vocabulary tools. From the qualitative data, NT03E expressed, "*Being easier to lose concentration than learning through books*", and VL01E stated, "*It's easy to get distracted while using online tools*", or NT19B said, "*Making it easy to lose focus while studying*". These results from the study support earlier studies, such as Tinio (2003), who said students prefer to use other resources more than they do vocabulary learning applications, and Bakia et al. (2012), who gave examples of how funding has been identified as one of the huge factors in students' choices of tools to use in online learning. Further, within the advance of technology, it has brought the students to question whether they are able to pay attention more to studying online or not (Junco 2012).

The other influential factors informing students' choices and the ways in which they use different online vocabulary learning tools seem to be preference for other types of learning platforms and cost concerns. The responses from the participants in our study revealed that they prefer learning platforms with multiple functions, including those with extensive resources that provide multiple subjects and interactive features. This shows that flexibility and an integrated, multi-disciplinary approach are preferred by many students.

4.2.2. The relationship between students' academic performance and their use of online tools

Regarding the question on the relationship between students' academic performance and their use of online English vocabuary tools, the results indicated the effectiveness of online learning tools in influencing student

achievement. The study revealed that students who frequently used technology expressed more positive attitudes and achieved higher vocabulary test scores than those who did not. Interestingly, the results revealed that it was the students' habit of using tools, not the advanced technology that determined the learning results. In other words, the more students use online tools in their learning process, the better results they can achieve.

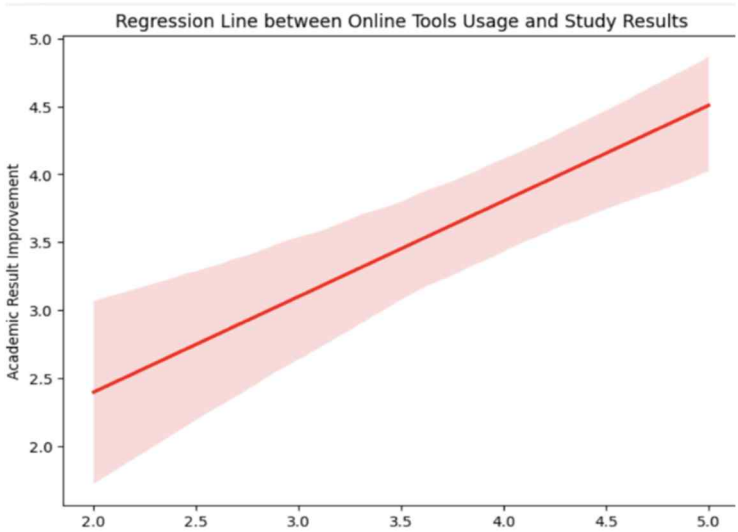

Figure 6. Pearson Correlation: Impact of Online Tools on Academic Success

The findings aligned with the qualitative data collected from the interview. Regarding the vocabulary remembering and retention through the use of online tools, one of the participants, DH12B, said, "*Online tools often use spaced repetition and reminders, which encourage regular practice. This consistency can help students retain vocabulary more effectively over time*".

To clarify the correlation between student outcomes and the use of online tools in vocabulary learning. The Pearson correlation analysis indicates a high correlation between the use of online tools and students' academic performance. The study demonstrates that the greater the frequency of using online tools, the more students' academic results improve. It not only demonstrates the efficiency in accessing quickly information but also points to responsible engagements in self-learning. The findings support Hsu and Ching's (2013) study in that the use of online tools during vocabulary learning can help students learn more new words. It enhances the tendency of students to choose to use online tools in their learning vocabulary according to the suitability that tools provide. The analysis shows that, the frequency in the use of online tools is 2.0, the score in academic performance increases to 2.4 . While this frequency increases from 2.0 to 5.0, it also spreads out to increase in academic performances from 2.0 to 4.5 (Figure 6). This means that there is a positive correlation between the frequency of online tool usage and students' academic performance. Analyzing the qualitative data concerning adcademic perforamnce through the use of online vocabulary learning tools, most of the participants held more or less the same opinion. Specificially, CB02E said, "*It help[s] me improve my speaking skills and my pronunciation. Sometimes it even make[s] me more confident*". Likewise, NL25I and VL01E opined, "*It helps learners review and gain vocabulary faster*", and "*Many games help remember vocabulary*", respectively. Taken together, these suggest that most students' perceptions about the tools are positive, and a correlation between the use of online tools and students' vocabulary learning outcomes are reflected.

Significantly, our study advanced existing TAM-based research by focusing on students' acceptance and use of mobile-assisted vocabulary learning tools, showing that besides the TAM perceived usefulness and ease of use combined (0.35), tool availability (0.34) (see Figure 4) for students significantly shaped their acceptance of integrated digital vocabulary tools. These findings deepen understanding of TAM constructs within modern, AI-enhanced vocabulary learning environments, offering both theoretical refinement and pedagogical implications for effective tool selection and integration.

5. Conclusion

This study aimed to investigate the factors affecting students' choice of online tools for vocabulary acquisition. The study used a mixed-methods approach and AI techniques to analyze data culled from our surveys and interviews, showing that students are willing to use online tools if they are accessible, useful, and enhanced. As more students develop stronger English skills, their attitudes toward using technology in learning become positive accordingly. This highlights the significant role that technology plays in advancing the quality of teaching and learning (Hsu and Ching 2013).

The results revealed that students tend to use broader online learning platforms rather than an application dedicated to just vocabulary learning, because of the flexibility of the learning platforms and a wide range of content and materials as well as learning experience entailed. Their preferences of online platforms also include their friendly interfaces and topic-diverse vocabulary. Moreover, the cost factor was also found to be significant, especially for students facing financial obstacles. Students of different economic backgrounds are more able to access resources of high quality if the tools are free or affordably priced. Therefore, educators and app developers should invest in easy-to-use, accessible platforms with rich content and materials.

The study confirmed a close correlation between the use of online tools and higher academic performance. The result revealed that students who tend to use online tools in their learning exhibit potential improvements in their academic performance. However, it is uncertain whether the strong correlation observed reflects true academic achievement or perceved performance. Besides, it should be noted that the study was conducted with a small sample size of students from different majors, leading to weakness of generalization or reasonable representation. Furthermore, the survey was conducted with the participation of students at a university on the Mekong Delta, and the participants could be affected by the individual opinions, attitudes, and backgrounds. Therefore, further research may need to include objective measures of academic achievement, along with self-reported data, to clarify whether the correlation reflects actual performance. Research may also consider the long-term impacts of specific online tools on vocabulary acquisition and perceived success and the effect of educational settings on tool efficacy. Future research could examine the level of lexical retention over the long term among learners and the use of online tools outside classes.

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Examples in: English
Applicable Languages: English
Applicable Level: Tertiary

Appendix

A. Survey Questionnaire

No.	Statements	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Disagree (5)
1	Online tools allow me to diversify my learning methods	¨	¨	¨	¨	¨
2	Online tools help me save time	¨	¨	¨	¨	¨
3	Online tools can quickly assess my learning outcomes	¨	¨	¨	¨	¨
4	Online tools help manage and reinforce my learning	¨	¨	¨	¨	¨
5	I can enhance my self-directed learning ability	¨	¨	¨	¨	¨
6	Online tools help reduce my stress while studying	¨	¨	¨	¨	¨
7	I believe online tools are suitable for beginners	¨	¨	¨	¨	¨
8	Online tools can be easily found and used	¨	¨	¨	¨	¨
9	Online tools provide rich and diverse learning resources	¨	¨	¨	¨	¨
10	I am concerned about data security	¨	¨	¨	¨	¨
11	I worry about overdependence on online tools.	¨	¨	¨	¨	¨
12	I worry some online tools lack offline support.	¨	¨	¨	¨	¨
13	Online tools improve my technology skills	¨	¨	¨	¨	¨
14	Online tools will benefit my future career	¨	¨	¨	¨	¨
15	Online tools boost my English confidence	¨	¨	¨	¨	¨
16	Online tools help me improve my vocabulary retention.	¨	¨	¨	¨	¨
17	Online tools motivate me more in learning English	¨	¨	¨	¨	¨
18	Using online tools has improved my performance	¨	¨	¨	¨	¨

19. How did you learn about online tools?
    - Through the support of teachers.
    - From friends who have used them.
    - While using social media.

20. What online English learning tool(s) do you usually use?
    - Duolingo
    - Memrise
    - Quizlet
    - ELSA Speak
    - Cake
    - Eng Breaking
    - Other (Please specify)

B. Interview Questions

1. Do you use online tools and/or apps for your English vocabulary learning? If yes, which online tools have you used? Why do you use them?
2. If you haven't used online tools for your vocabulary learning, what alternative ways do you find more effective for your context? Why?
3. What are disadvantages or concerns of using online tools?
4. How do you think the design and user interface of online tools affect your motivation and engagement in vocabulary learning?
5. In your opinion, how might online tools impact student vocabulary learning outcomes in general, even if you haven't used and do not plan to use it?

C. List of the Study Participants

No.	Coded	Majors	Gender
1	VL01E	English	Female
2	CB02E	English	Male
3	NT03E	English	Male
4	DA04E	English	Female
5	LN05E	English	Male
6	VD06E	English	Male
7	NV07E	English	Female
8	NV08E	English	Male
9	NH09E	English	Female
10	NV10E	English	Female
11	AD11E	English	Female
12	DD12E	English	Male
13	NK13B	Business	Female
14	DH14B	Business	Female
15	NM15B	Business	Female
16	NL16B	Business	Female

17	PT17B	Business	Female
18	NN18B	Business	Female
19	NT19B	Business	Female
20	TT20B	Business	Female
21	VQ21B	Business	Female
22	MT22B	Business	Female
23	TD23B	Business	Female
24	NH24B	Business	Female
25	NL25I	IT	Male
26	NT26I	IT	Male
27	NT27I	IT	Male
28	NL28I	IT	Male
29	BP29I	IT	Male
30	NV30I	IT	Male
31	ND31I	IT	Male
32	VT32I	IT	Male
33	ND33I	IT	Male
34	AD34I	IT	Male
35	HN35I	IT	Male
36	HD36I	IT	Male

D. Survey for on vocabulary learning tool

https://docs.google.com/spreadsheets/d/1X70VTlddNQ0ikprqC0PACo2zMZbl0KlDhetTiYHAqio/edit?gid=1583919895#gid=1583919895

E. Transcript of the Interviewees

https://docs.google.com/spreadsheets/d/1gAoqAZUp9_vqsv7cIpxPC_CyNZAsL1_fl489oZQdO_c/edit?usp=drive_link