WEB-BASED APPROACH TO IMPROVE ACADEMIC VOCABULARY OF PRE-UNIVERSITY ESL LEARNERS

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ABSTRACT

Mastering academic vocabulary is crucial for post-secondary English as a Second Language (ESL) learners as academic language plays a key role in their academic success. However, many Malaysian ESL learners struggle to acquire and use academic vocabulary effectively, often due to the limitations of traditional instructional approaches. This study examines the effect of a web-based learning resource on the learning of academic vocabulary among 33 pre-university ESL learners from a Centre of Foundation Studies in Kuala Lumpur, Malaysia. A one-group pre-test post-test research design was employed over an eight-week intervention programme. Results, analysed using the Wilcoxon signed-rank test, revealed an improvement that was statistically significant in academic vocabulary scores ($z = -4.25$, $p < 0.005$) with a large effect size ($r = 0.52$). Key features of the web-based resource, which include sentence-writing activities, explicit instruction, and a flexible learning environment, have likely contributed to these outcomes. This study showcases the potential effectiveness of web-based learning tools in enhancing the learning of academic vocabulary among post-secondary ESL students by offering engaging and interactive learning opportunities.

Keywords: academic vocabulary; ESL learners; vocabulary learning; web-based learning

Introduction

The mastery of academic English vocabulary is essential for pre-university English as a Second Language (ESL) learners as they transition into academic study. Academic vocabulary consists of specialised words commonly used across disciplines and is crucial for understanding and producing academic discourse (Coxhead, 2021; Dang, 2022; Lawrence et al., 2022; Nation, 2022; Skjelde & Coxhead, 2020; Therova, 2021). Empirical evidence shows that depth of academic vocabulary knowledge significantly influences academic success (Alsahafi, 2023). However, many Malaysian post-secondary learners struggle with both understanding (Amir & Sulaiman, 2024; Khan & Ariffin, 2023; Lee et al., 2017; Sulaiman et al., 2018) and using academic vocabulary (Aziz et al., 2021; Ibrahim et al., 2019).

These challenges are often linked to the limitations of traditional instructional methods (Fisal & Said, 2023; Srivani et al., 2022), which tend to prioritise memorisation over meaningful use. Practices such as rote learning and vocabulary notebooks may support short-term recall but offer limited support for deep processing and long-term retention (Shi & Li, 2021). As a result, learners often retain word meanings without being able to use them effectively (Guo et al., 2023; Zai, 2023). Such methods do not sufficiently support the progression from initial exposure to productive use of vocabulary (Brown & Payne, 1994; Ma, 2015). This contributes to a persistent gap between receptive knowledge and productive ability among Malaysian ESL learners.

Web-based learning tools have become increasingly prominent in vocabulary instruction due to their multimodal and interactive features (Xodabande et al., 2022; Zhang, 2021). These tools complement traditional instruction, particularly in ESL contexts where additional support is often required (Knežević et al., 2020; Tan & Goh, 2020). Web-based learning can facilitate academic transition by extending learning beyond the classroom (Zhang, 2021) and offers flexibility, interactivity, and personalised experiences (Kassim et al., 2024; Nhan, 2024; Sani & Mohamad, 2023). Evidence also shows improvements in engagement, motivation, and vocabulary gains (Alhujaylan, 2021; Krishan et al., 2020; Knežević et al., 2020; Tan & Goh, 2020). The COVID-19 pandemic further reinforced the importance of accessible online resources (Tahir et al., 2021a; Vu, 2021). When designed effectively, web-based tools can support learner autonomy and provide extended exposure needed for internalising academic vocabulary (Xodabande & Atai, 2020; Xodabande et al., 2022).

Extended exposure to English instruction has not translated into sufficient command of academic vocabulary among ESL learners, especially in terms of active use. Malaysian ESL learners are particularly affected given their minimal prior exposure to academic vocabulary (Othman, 2024), limited access to academic English in conventional classrooms, and few opportunities to practise the language beyond classroom settings (Amir & Sulaiman, 2024; Fisal & Said, 2023; Amir & Sulaiman, 2024; Sulaiman et al., 2020). Although web-based vocabulary tools have been widely examined, few specifically address academic vocabulary learning among Malaysian pre-university ESL learners.

This study investigated the effectiveness of a web-based learning resource designed to enhance their academic vocabulary learning. Specifically, it sought to

answer the following research question: Is there a significant difference in the academic vocabulary scores of pre-university ESL learners before and after using the web-based English academic vocabulary learning resource? If yes, it is to what extent?

Literature Review

Implicit and Explicit Vocabulary Learning

In this paper, the term "vocabulary learning" is used instead of "vocabulary acquisition" as the study aligns itself with the structured, intentional approach used in the web resource. While language acquisition refers to the subconscious and natural development of language through exposure and interaction (Nation, 2022), language learning involves conscious effort and deliberate study of linguistic elements.

Vocabulary learning involves acquiring and understanding words and their meanings through repetition and quality mental processing (Nation, 2022). It progresses along a linear path, from encountering words in receptive contexts to gradually using them productively in writing and speaking (Ma, 2015; Nation, 2001; Teng & Xu, 2022). This process deepens learners' knowledge of words, including meaning, usage and grammar.

Vocabulary can be developed through two key approaches: implicit learning and explicit learning. Implicit learning occurs incidentally, such as inferring word meanings while reading or listening. Though reading academic materials is commonly perceived as the primary source of lexical exposure (Therova, 2021), it alone may not be sufficient for ESL learners to acquire academic words (Aldawsari, 2017; Sulaiman et al., 2018). The common reasons include materials exceeding learners' proficiency (Wei, 2021) and learners' limited metacognitive awareness of word importance and frequency of use (Kaur, 2020). Furthermore, textbooks recommended by institutions may not meet learners' academic vocabulary needs. Many offer limited word forms and contextual usage (Faraj, 2015), resulting in non-interactive and ineffective vocabulary lessons. ESL learners report dissatisfaction with the lack of vocabulary practice found in class textbooks (Fisal & Said, 2023). Without repeated exposure, learners struggle to retain and retrieve new words.

In contrast, explicit learning can enhance vocabulary learning. For instance, Tahir et al. (2021b) found that explicit vocabulary instruction increases learners' enthusiasm for learning and knowledge of vocabulary. According to Sulaiman et al. (2020), early, specialised academic vocabulary instruction in post-secondary education is pertinent to improving comprehension of academic materials. Explicit strategies such as direct instruction, repeated exposure, and active word use are more effective for ESL learners to assimilate word meanings (Beck et al., 2013; Gallagher et al., 2019; Nation, 2001; Schmitt, 2008, 2010). Multiple exposures through hearing, seeing and using words foster a deeper processing and ultimately long-term internalisation of the vocabulary, while associating new words with familiar ones such as synonyms or descriptions activates prior knowledge and strengthens comprehension (Wei, 2021). Activities like creating sentences, highlighting unfamiliar words and interacting meaningfully with vocabulary further promote retention (Zucker et al., 2021).

Given the limited opportunity for Malaysian ESL learners to use academic vocabulary productively (e.g., Aziz et al., 2021; Ibrahim et al., 2019), this paper highlights active usage in digital environments as an important strategy. As argued by Othman (2024), obstacles in learning academic vocabulary can be overcome by using contextual clues and active engagement. Contextualised interactions and summary writing can encourage vocabulary use (Sulaiman et al., 2018; Wei, 2021). Writing practices, in particular, help learners transform receptive knowledge into productive use and enhance retention of higher-level vocabulary (Teng & Xu, 2022). Numerous studies also confirm the positive impact of language use on vocabulary learning (Pichette et al., 2012; Teng & Xu, 2022).

Previous Studies on Academic Vocabulary Instruction

Traditional instruction approaches for academic vocabulary involves vocabulary notebooks, picture cards, contextual definitions (August et al., 2020), and map organisers (Gallagher et al., 2019). While beneficial, these approaches face challenges like poor long-term retention, limited retrieval, and low intrinsic motivation among learners (Farjami, 2018; Shi & Li, 2021). Instruction focused solely on pronunciation, form, and meaning without context can lead to monotony and reduced learner interest (Guo et al., 2023). Although rote memorisation may aid retention, it does not promote practical vocabulary use (Zai, 2023), which is vital for vocabulary learning.

In contrast, technology-integrated vocabulary instruction provides interactive and engaging environments that reduce anxiety and increase motivation. Online tools such as learning websites, digital dictionaries, and games support active vocabulary use and are often more effective than traditional methods (Mundir et al., 2022). Multimodal approaches integrating text, audio, and visuals help bridge the gap between vocabulary knowledge and application (Zai, 2023). Online resources with customisable learning paths, adaptable pacing, accessible materials, and interactive feedback can enhance vocabulary learning (Cantos et al., 2023). Furthermore, technology also fosters self-directed learning, giving learners greater opportunities and autonomy in practising academic vocabulary (Ankeny, 2019; Li et al., 2017; Simanjuntak, 2020; Xodabande & Atai, 2020).

Numerous studies confirm the effectiveness of digital tools in improving academic vocabulary (Alhujaylan, 2021; Ankeny, 2019; Knežević et al., 2020; Li et al., 2017; Simanjuntak, 2020; Xodabande & Atai, 2020). For instance, Dizon (2016) reported significant academic vocabulary gains using Quizlet, while Ali (2018) demonstrated a positive correlation between learners' perceptions of the effectiveness and usefulness of Hot Potatoes exercises. Ashcroft et al. (2018) highlighted the value of non-linear navigation, immediate feedback, varied activities, and increased learner autonomy in developing metacognitive awareness. Similarly, Tan (2018) found gamified instruction with Kahoot improved retention. Digital flashcards also outperformed traditional paper-based methods for vocabulary learning (Mohammadi et al., 2024; Xodabande et al., 2022; Zarrati et al., 2024). Nonetheless, Mohammadi et al. (2024) emphasise the need for complementary methods to enhance productive use of vocabulary through more interactive tasks.

Web-Based Vocabulary Learning

Web-based learning has improved learners' performance and perceptions. Common tools include learning websites (Alhujaylan, 2021; Altiner, 2019; Bashori et al., 2021; Knežević et al., 2020). Hajebi et al. (2018) reported vocabulary gains from the International English Language Testing System (IELTS) websites, while Knežević et al. (2020) found Moodle-supported websites improved academic vocabulary among ESL undergraduates. Alhujaylan (2021) successfully established a web-based learning environment by introducing numerous vocabulary websites, while Bashori et al. (2021) reported increased vocabulary gains and enjoyment. These studies collectively support the affordance of web-based approaches in promoting the learning of academic vocabulary.

Web-based learning is also impactful in flipped and blended classroom models common in post-secondary institutions. Fayaz and Ameri-golestan (2016) observed better vocabulary gain and retention in active web-based environments. Likewise, Knežević et al. (2020) attributed higher vocabulary gains to pre-class engagement, which reduced mental effort. The reduced reliance on teacher-centred instruction allows greater time for independent practice, enhancing engagement (Alhujaylan, 2021; Knežević et al., 2020) and motivation (Al-Johali, 2019; Hussain, 2018), extending learning beyond the classroom. These findings indicate that web-based tools can encourage faster task completion and learning. Besides, they provide extra support in the initial stages of vocabulary learning, such as the learning of academic vocabulary at post-secondary level, where reinforcement of definitions, synonyms, and pronunciation are crucial (Hussain, 2018). According to Zhang (2021), web resources can supplement classroom learning by providing additional opportunities for knowledge and practice.

When the world faced the COVID-19 pandemic, the role of web-based learning tools became even more pronounced. The demand for remote learning necessitated a shift to digital instructions. This transition accelerated the integration of online platforms and reshaped vocabulary instructions. Instructors adapted by incorporating online formative assessments, flashcards, and self-directed study habits (Shamsan et al., 2021; Vu, 2021). For instance, Vietnamese EFL learners using interactive web platforms retained more vocabulary than peers in traditional teacher-centred environments (Vu, 2021). Similarly, Saudi EFL learners using Quizlet and online games developed a greater reliance on technology and independent learning strategies (Shamsan et al., 2021). However, Al-Jarf (2022) discussed decreased motivation among learners lacking self-regulation during the shift and recommended diverse digital tasks to maintain engagement. Additionally, Tahir et al. (2021b) emphasised the importance of explicit vocabulary instruction tailored for online learning via contextualised and interactive digital activities.

The pandemic-driven adoption of web-based vocabulary learning brought lasting implications for language instruction, facilitating personalised learning and flexible access to resources (Tahir et al., 2021a). While challenges persist, hybrid approaches, which combine digital and in-person learning, continue to evolve (Vu, 2021).

Methodology

Design

The one group pre-test-post-test design (Cohen et al., 2007; Cook & Campbell, 1979; Sekaran & Bougie, 2016; Shadish et al., 2001) was employed. The differences in test scores obtained before and after the intervention help determine the potential effect of utilising the web resource on improving learners' academic vocabulary.

Participants

One intact class of 33 pre-university ESL learners from a Foundation Studies Centre in Kuala Lumpur was selected. The learners were enrolled in Semester Two of a one-year Life Sciences Foundation Programme (2022/2023), in which they took a compulsory English Proficiency Course aimed at developing academic reading, writing, and vocabulary skills in preparation for undergraduate studies. This course served as the instructional context for the web-based academic vocabulary intervention. All learners had achieved at least a B in the Malaysian Certificate of Education (SPM) English paper, indicating an upper-intermediate level of proficiency. This homogeneity in language proficiency allowed a clearer assessment of the web resource's effect on academic vocabulary development, as it reduced variability and enhanced the internal validity of the findings (Creswell & Guetterman, 2021). Additionally, the learners' transitional stage into post-secondary education aligned with the research that highlighted the critical role of academic vocabulary in supporting the sudden shift towards academic English (Coxhead, 2021).

The majority of ESL learners who participated in this study were female (69.7%, n=23), and 30.3% (n=10) were male. Given the same academic cohort origin, 90% (n=30) of the respondents are 19 years old, while 9.1% (n=3) are 18. All respondents (100%, n=33) identified as Malays and Muslims. In the class group, 36.4% (n=12) obtained the topmost grade of A+ in the SPM examination, while 45.4% (n=15) achieved an A grade. The remaining 18.2% (n=6) obtained the lowest score of A-. This distribution demonstrated that the respondents had similar upper-intermediate to advanced level of English language proficiency, highlighting their command of general vocabulary. This prerequisite sufficiently prepared them for learning academic vocabulary on the web-based learning resource.

The class was conducted by a Malay female teacher holding a Master's degree in Education (MEd) and possessing 11-15 years of lecturing experience at the Centre. Her familiarity with the learners and curriculum supported smooth integration of the web-based resource, including weekly reminders and testing assistance. Having contributed to an earlier learner needs analysis, her involvement ensured alignment with classroom practices with minimal disruption.

Instrument

The academic vocabulary section of the Vocabulary Levels Test (Schmitt et al., 2001) was used as the pre-test (Version 1) and post-test (Version 2) to measure learners' knowledge of receptive academic vocabulary. The tests were in parallel forms, meaning they assessed the same construct using different sets of items of equivalent difficulty, so they could be used interchangeably in longitudinal studies (Xing & Fulcher, 2007). This feature allowed both versions to be used with the same group of learners on two occasions without any memory effect confounding results (Kremmel & Schmitt, 2017). The tests employed a multiple-choice format, whereby test-takers matched target words to their definitions or synonyms. Both versions contained 10 clusters, each containing six target words and three definitions, constituting 30 items per version. The words were selected from the Academic Word List (AWL) (Coxhead, 2000), with the two tests collectively covering 60 out of 570 AWL word families (10.5%). Most importantly, all word items in both versions were covered within the web-based learning resource to ensure alignment between the learning content and the assessment.

The reliability of the instruments was assessed using Cronbach's alpha, a coefficient ranging from 0 to 1, with higher values indicating greater internal consistency (Conroy, 2021). The Vocabulary Levels Test is validated with high internal consistency with Cronbach's alpha values of 0.958 (Version 1) and 0.960 (Version 2) (Schmitt et al., 2001). A pilot test with 33 learners confirmed the instruments' local reliability, yielding Cronbach's alpha values of 0.708 (Version 1) and 0.751 (Version 2) when analysed using SPSS V26. As values above 0.70 were considered acceptable (George & Mallery, 2003), these results indicated acceptable internal consistency for the context of this study.

To assess the normality of the data distribution, a Shapiro-Wilk test was conducted using SPSS V26, given the small sample size (n<50) (Mishra et al., 2019; Shapiro & Wilk, 1965). The results of the normality test on both scores are displayed in Table 1.

Table 1
Normality Test

	Shapiro-Wilk		
	Statistic	Df	Sig.
Pretest Score	.817	33	.000
Posttest Score	.846	33	.000

The results revealed a significant departure from normality for both pre-test scores (W= 0.817, p <0.005) and post-test scores (W= 0.846, p <0.005), indicating that the data were not normally distributed. Hence, a non-parametric test, the Wilcoxon signed-rank test, was conducted to find out if there is a significant difference in the academic vocabulary scores of pre-university ESL learners before and after using the web-based English academic vocabulary learning resource. Then, the effect size was

calculated using this formula: r = Z/sqrt(N) (Fritz et al., 2012; Rosenthal, 1991), where N was the number of observations in total (Coolican, 2013; Pallant, 2007). The effect size utilised Cohen's (1988) guideline for interpreting *r*, as recommended by previous scholars (Coolican, 2013; Field, 2018; Fritz et al., 2012; Pallant, 2016) when conducting the Wilcoxon test. Table 2 shows Cohen's effect size interpretation.

Table 2
Cohen' Effect Size Guideline for r

R	Interpretation
0.1	Small
0.3	Medium
0.5	Large

Data Collection Procedures

The study involved an eight-week intervention using a self-instructed, web-based academic vocabulary learning resource developed by the researchers. The resource contained interactive exercises featuring 170 AWL items selected based on learners' needs and aligned with the Vocabulary Levels Test. While the details of the design and development of the web resource are beyond the scope of this paper, the implementation procedure is outlined here.

At the start of the study, learners completed the academic vocabulary section of Vocabulary Levels Test Version 1 as a pre-test to measure their existing knowledge of academic vocabulary. After completing the pre-test, the researchers introduced the web resource and guided learners on its use. A tutorial video (Figure 1) was provided to scaffold independent learning by demonstrating key features of the web resource, such as the Homepage (Figure 2). Learners could revisit this video as needed to reinforce their understanding of the interface and task expectations.

Learners were instructed to use the web resource independently over eight weeks. Weekly in-class reminders were provided by the English teacher mentioned earlier to encourage consistent engagement. At the end of the period, learners completed the academic vocabulary section of Vocabulary Levels Test Version 2 as a post-test, which was administered by the researchers. Each test session lasted 30 minutes and was conducted in class with the teacher's assistance. Test responses were marked and tabulated for analysis by the researchers.

Prior to participation, informed consent was obtained from all respondents, ensuring voluntary participation and confidentiality.

Figure 1
Tutorial Video

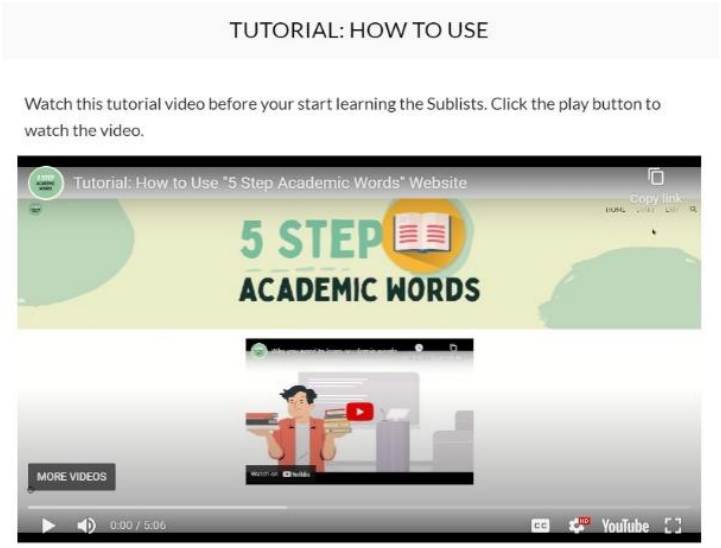
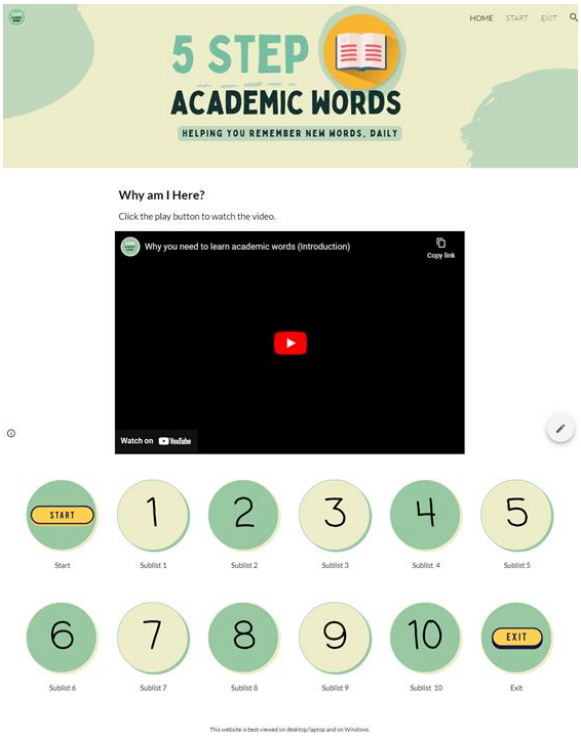


Figure 2
Homepage



Results

Effects of Web-Based Learning Resource

An analysis of a Wilcoxon signed-rank test was used to determine if there was a significant difference in academic vocabulary knowledge among pre-university ESL learners as a result of utilising the web resource. The null and alternative hypotheses tested were:

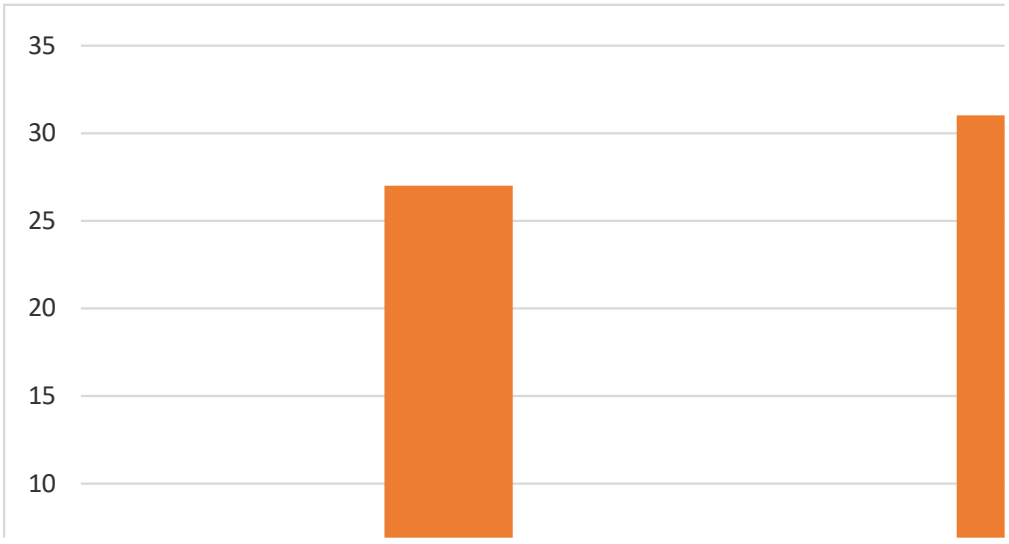
H_0: There is no significant difference in learners' academic vocabulary score before and after using the web-based English academic vocabulary learning resource.

H_1: There is a significant difference in learners' academic vocabulary score before and after using the web-based English academic vocabulary learning resource.

The current study stipulates that a learner must gain a minimum score of 83% (25/30) to reach the mastery level for the academic section of the Vocabulary Levels Test, following existing literature (Abmanan et al., 2017; Skjelde & Coxhead, 2020; Tan, 2018). Figure 3 illustrates the mastery level reached by the participants for the pre-test and post-test scores.

Figure 3

Mastery Level of the Academic Vocabulary (Pre-test vs Post-test scores in Vocabulary Levels Test)



As seen in Figure 1, during the pre-test, 27 participants (81.82%) achieved the 83% threshold, while six participants (18.18%) did not reach the recommended mastery level. In contrast, in the post-test, the number of participants who reached the 83% mastery level increased to 31 (93.94%), with only two (6.06%) participants falling short. This finding indicates a 12.12% increase in the number of participants who successfully achieved the 83% threshold for academic vocabulary in the post-test

of Vocabulary Levels Test compared to the pre-test. To confirm this finding, an inferential statistic was conducted. Table 3 and Table 4 present the results of the Wilcoxon signed-rank test.

Table 3
Ranks of Wilcoxon Signed-Rank Test

		N	Mean Rank	Sum of Ranks
Posttest Score - Pretest Score	Negative Ranks	3[a]	9.33	28.00
	Positive Ranks	27[b]	16.19	437.00
	Ties	3[c]		
	Total	33		

a. Posttest Score < Pretest Score

b. Posttest Score > Pretest Score

c. Posttest Score = Pretest Score

Table 4
Wilcoxon Signed-Rank Test Statistics

Test Statistics[a]

	Posttest Score - Pretest Score
Z	-4.247[b]
Asymp. Sig. (2-tailed)	.000

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

As seen in Tables 3 and 4, the results revealed that the academic vocabulary test scores were statistically and significantly higher after the intervention (Mdn = 29) compared to before (Mdn = 27), $z = -4.25$, $p < 0.005$, with a large effect size ($r = 0.52$). Therefore, the null hypothesis was rejected. These findings support the conclusion that participants' knowledge of academic vocabulary improved as a result of utilising the web-based learning resource during the treatment period.

Discussion

The potential effectiveness of the web-based learning resource in enhancing pre-university ESL learners' academic vocabulary, as evidenced by the test results, can be attributed to three interconnected features, namely the emphasis on productive vocabulary use, the incorporation of explicit instructional strategies, and the flexible learner-centred environment.

Firstly, the inclusion of sentence-writing activities within the web-based resource encouraged active and meaningful engagement with academic vocabulary. By prompting learners to write original sentences using target academic words and respond to contextualised questions containing them, the web resource guided learners from comprehension to production, which is a transition essential for comprehensive vocabulary learning (Ma, 2015; Teng & Xu, 2022). These writing tasks reflect Brown and Payne's (1994) vocabulary learning stages, particularly their emphasis on contextualisation, construction and use. Repeated exposure and varied engagement with word forms, meanings and collocations likely contributed to both short and long-term retention. This finding concurs with previous studies highlighting that language use facilitates vocabulary acquisition more effectively than receptive exposure alone (Pichette et al., 2012; Teng & Xu, 2022). By integrating these principles, the web-based resource helps close the well-documented gap between receptive and productive academic vocabulary knowledge. Khalilova (2023) stated that although learners may become familiar with academic words, they often struggle to use them actively in oral and written communication. Thus, productive vocabulary tasks enhance academic vocabulary learning outcomes (Sulaiman et al., 2018; Wei, 2021; Zucker et al., 2021).

Secondly, the web resource integrates explicit instructional strategies to deepen learners' understanding of academic vocabulary. By separating complex words into manageable parts, providing contextualised explanations, and associating academic words with synonyms, general English vocabulary, and familiar structures, the web resource supports learners in internalising word meanings beyond surface-level definitions (Nation, 2022). Associating new word with synonyms activates learners' prior knowledge and facilitates comprehension (Wei, 2021). These key features made abstract academic words more accessible and easier to remember. Additionally, the inclusion of interactive exercises across five structured learning stages ensured multiple word retrievals across various contexts, further enhancing the assimilation process of newly acquired vocabulary. Rather than relying on learners to identify and study academic words independently, the web resource explicitly guided their attention to specific words, ensuring consistent exposure and deliberate practice (Alhujaylan, 2021; Ali, 2018; Knežević et al., 2020; Xodabande et al., 2022). These combined strategies appear to facilitate a shift from unconscious to conscious language processing, allowing learners to internalise academic words more effectively, contributing to the increased test scores shown in the findings.

Thirdly, the web resource offers a flexible and learner-centred environment that accommodates different learning preferences and pace. By removing time and geographical constraints, learners can engage with the materials independently and revisit them as needed. This autonomy appears to promote intrinsic motivation, reduce classroom-related anxiety, and support a more personalised learning experience. Moreover, the non-linear structure of the web resource allows learners to select vocabulary sublists based on their needs. The flexibility of the resource facilitates goal-oriented learning and self-regulation. Learner choice and autonomy in web-based platforms can increase vocabulary gains, motivation, engagement and enjoyment (Ashcroft et al., 2018; Bashori et al., 2021).

In addition, the present study showed a decrease in the number of learners scoring below the mastery level after the intervention, suggesting that the flexible nature of the web resource helped to narrow the gap between lower-proficiency students and their higher-proficiency peers. Ashcroft et al. (2018) also found that digital tools can support metacognitive growth and vocabulary development across proficiency levels. Web-based instructions have a positive effect on academic vocabulary learning (Alhujaylan, 2021; Aswad et al. 2022; Tan, 2018). The customisability of the web resource across devices makes it practical to use as a convenient and pedagogically robust tool that effectively facilitates differentiated learning.

Conclusion

This study shows that a web-based learning resource can effectively enhance academic vocabulary among pre-university ESL learners by integrating sentence-writing activities, explicit instruction, and a flexible learning environment. These features encourage active engagement, independent learning, and repeated practice, helping learners bridge the gap between knowing academic words and using them appropriately. The approach not only complements traditional instruction but also supports learner autonomy and motivation, particularly for Generation Z, and adds to evidence that web-based instruction is a valuable means of developing academic vocabulary at the post-secondary level.

This study contributes to web-based academic vocabulary research by illustrating how an online environment can move learners beyond receptive knowledge towards productive use. However, the findings are limited by the specific learner group and short intervention period, which constrain generalisability and do not capture long-term retention. Future research could involve more diverse samples, longer intervention periods, and the inclusion of control groups to provide a clearer understanding of the resource's impact.

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