

Lexical acquisition in blended EFL learning: Integrating the enriched virtual model into VARK learning styles

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Abstract

Vocabulary knowledge plays a fundamental role in second language (L2) proficiency and is strongly linked to students' academic success in higher education. As blended learning becomes increasingly prevalent in university contexts, there is a growing need for instructional models that promote flexibility, learner engagement, and multimodal input. This study investigates the integration of VARK learning styles—Visual, Aural, Read/Write, and Kinesthetic—within the Enriched Virtual Model (EVM) to support lexical competence among English as a Foreign Language (EFL) learners. Adopting a mixed-methods design, the study involved 53 undergraduate students enrolled in a Lexical Studies course. Quantitative data were collected through pre- and post-tests to measure lexical gains, while qualitative insights were obtained from reflective journals and semi-structured interviews. Quantitative data were analyzed using paired-sample t-tests to examine pretest–posttest differences, one-way ANOVA to compare vocabulary gains across VARK learning-style groups, and Cohen's d to determine effect size. Qualitative data were analyzed thematically following Braun and Clarke's six-step framework. The findings reveal a statistically significant improvement in students' lexical mastery, with a large effect size indicating a strong instructional impact. Analysis across VARK categories shows that Visual and Read/Write learners benefited most from the multimodal online materials, although positive progress was observed across all learning-style groups. Qualitative results further indicate that the VARK-informed EVM enhanced learner engagement, autonomy, and motivation by allowing students to interact with vocabulary through varied and flexible modalities. However, challenges related to cognitive workload and limited opportunities for kinesthetic engagement in online environments were also reported. These findings suggest the importance of balancing modality representation when designing blended vocabulary instruction. Overall, this study contributes to multimodal lexical pedagogy and offers practical implications for developing adaptive and learner-centered blended learning models in higher education.

Keywords: Enriched Virtual Model (EVM); learning style; lexical acquisition, VARK

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INTRODUCTION

Vocabulary knowledge is generally recognized as a fundamental factor in achieving second language (L2) proficiency. It is the basis of this defense learners make hearing, spoken and written texts, reproducing thoughts accurately, contributing substantively to academic and professional communication. Vocabulary becomes more than just a peripheral aspect of language learning. It is the road sign to grammatical correctness and pragmatic ability. Learners with restricted lexical resources have difficulty processing input efficiently (i.e., during comprehension and production), producing well-formed utterances, and maintaining meaningful interaction in English (Barrot, 2021; Li, 2022). However, such challenges are particularly salient within the context of higher education, where English is often used as a language for academic study and scholarly engagement (Derakhshan et al., 2020; Chen, 2021).

In Indonesian universities, vocabulary mastery is especially critical for students of English as a Foreign Language (EFL), as lexical competence underpins learners' ability to function effectively in academic contexts where English is used as the medium of instruction and scholarly communication (Nation, 2013; Schmitt, 2014). Academic success at the tertiary level requires not only general English proficiency but also control over academic and discipline-specific vocabulary, which is essential for understanding specialized texts and producing field-appropriate written discourse (Hyland & Tse, 2007; Coxhead, 2018). Students are expected to read scholarly texts, write research-based assignments, and follow lectures delivered in English, tasks that place substantial demands on both receptive and productive vocabulary knowledge (Dang & Webb, 2016; Nation & Webb, 2011). Moreover, the ongoing internationalization of higher education has increased expectations for students to engage with global research communities, participate in academic exchanges, and collaborate across linguistic and cultural boundaries, further intensifying the need for advanced academic vocabulary competence (Dearden, 2015; Jenkins, 2019). These demands require learners to retrieve, manipulate, and apply lexical items accurately and flexibly across a range of academic tasks, highlighting the importance of depth of vocabulary knowledge rather than mere word recognition (Schmitt, 2014; Webb & Nation, 2017). Consequently, vocabulary instruction in higher education must move beyond surface-level learning and adopt approaches that are systematic, pedagogically sound, and responsive to learners' cognitive and affective needs (Nation, 2013; Laufer & Goldstein, 2004).

Traditional approaches to vocabulary instruction, such as rote memorization, isolated word lists, and decontextualized dictionary use, have been widely criticized for their limited effectiveness in promoting long-term retention. Contemporary research in applied linguistics emphasizes the importance of contextualized exposure, repeated encounters, meaningful use, and multimodal reinforcement in vocabulary learning (Laufer & Goldstein, 2004; Webb & Nation, 2017). In response to these pedagogical insights, technology-enhanced learning environments have gained prominence, offering opportunities to enrich vocabulary instruction through interactive, flexible, and learner-centered designs.

One instructional approach that has gained considerable attention in higher education is blended learning, which combines online and face-to-face instruction to enhance flexibility while maintaining pedagogical effectiveness and supporting learner autonomy (Graham, 2013). Within this broader framework, the Enriched Virtual Model (EVM) represents a distinctive blended-learning design in which most instructional content is delivered online, complemented by periodic in-person sessions. Unlike flipped classrooms that maintain regular face-to-face meetings, EVM relocates lectures, guided input, and initial practice to well-structured online modules, while reserving classroom time for application, discussion, feedback, and collaborative learning activities (Staker & Horn, 2015).

The EVM is particularly well suited to vocabulary instruction. Online platforms allow learners to access materials asynchronously, revisit content multiple times, and engage with vocabulary through varied media formats. These affordances support spaced repetition and self-regulated learning—two factors consistently linked to durable lexical acquisition. Previous studies have shown that blended vocabulary instruction can significantly improve learners' vocabulary knowledge, motivation, and engagement (Tosun, 2015; Katasila, 2022). However, the effectiveness of EVM depends largely on how instructional materials are designed and the extent to which they address individual learner differences.

One influential framework for understanding learner preferences is the VARK model, which categorizes learning modalities into Visual, Aural, Read/Write, and Kinesthetic. Although the concept of learning styles has been subject to debate, recent research suggests that instruction informed by VARK principles—when implemented flexibly—can enhance learner engagement and support comprehension by providing multiple pathways for processing information (Clinton-Lisell et al., 2024). Rather than rigidly matching instruction to a single preferred style, current pedagogical perspectives advocate multimodal designs that allow learners to interact with content through diverse sensory and cognitive channels.

In lexical learning contexts, VARK-informed strategies offer clear pedagogical advantages. Visual learners benefit from diagrams, infographics, and word maps; aural learners from listening activities and pronunciation-focused input; read/write learners from structured texts and note-taking tasks; and kinesthetic learners from interactive and experiential activities. By integrating these modalities, instructors can create more inclusive learning environments that accommodate diverse learner profiles while reinforcing lexical knowledge through multiple forms of representation.

Despite growing interest in blended learning and multimodal instruction, empirical studies that integrate the VARK framework within the Enriched Virtual Model (EVM) remain limited, particularly in higher education contexts in developing countries. Conceptually, EVM aligns well with VARK-informed design: online modules can incorporate rich multimodal input, while face-to-face sessions provide opportunities for communicative practice and kinesthetic engagement. However, little research has systematically examined how this integration influences vocabulary learning outcomes or how learners with

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different modality preferences respond to such instructional configurations (Staker & Horn, 2015).

This research gap is especially relevant in the Indonesian higher education context, where universities are increasingly adopting digital learning infrastructures while simultaneously facing challenges related to digital literacy, access, and instructional readiness. Addressing these challenges requires empirically grounded models that demonstrate how blended and multimodal approaches can be implemented effectively and equitably.

Accordingly, the present study investigates the implementation of a VARK-informed Enriched Virtual Model in vocabulary instruction. Specifically, it aims to (1) examine the impact of VARK-informed EVM instruction on students' lexical acquisition, (2) identify differences in learning outcomes across Visual, Aural, Read/Write, and Kinesthetic learners, and (3) explore students' perceptions of the VARK-EVM approach in supporting vocabulary mastery. By operationalizing multimodal design principles within an online-first blended framework, this study seeks to contribute both theoretically and practically to the development of more adaptive and effective vocabulary instruction in higher education.

Blended learning in higher education

Blended learning has emerged as a prominent instructional approach in higher education, driven by rapid digitalization and the growing demand for flexible learning environments. Broadly defined as the integration of face-to-face and online learning experiences, blended learning enables educators to capitalize on the complementary strengths of both modalities. While in-person instruction offers immediacy, interaction, and social presence, online learning provides flexibility, accessibility, and opportunities for self-paced engagement (Garrison & Vaughan, 2017). This combination is particularly beneficial for cognitively demanding learning tasks, such as vocabulary acquisition, which require repeated exposure and sustained practice.

A substantial body of empirical research indicates that blended learning enhances learner engagement, motivation, and academic achievement across disciplines. In English as a Foreign Language (EFL) contexts, blended learning has demonstrated strong potential for supporting vocabulary development by providing learners with frequent exposure to lexical items through digital tools, multimedia input, and interactive practice. For instance, Tosun (2015) reported that vocabulary instruction combining online materials with classroom-based activities led to significant improvements in learners' vocabulary retention and comprehension. Digital resources commonly used in blended environments—such as interactive quizzes, multimedia glosses, and learning management systems—allow learners to revisit materials multiple times, aligning well with principles of spaced repetition and distributed practice.

In Indonesia, the adoption of blended learning has accelerated considerably, particularly in the aftermath of the COVID-19 pandemic, which prompted universities to implement hybrid instructional models. Studies conducted in Indonesian higher education contexts suggest that blended learning increases student motivation, fosters learner autonomy, and encourages deeper engagement with learning materials (Widyastuti, 2021;

Ariyanti, 2022). Nevertheless, several challenges remain, including unequal access to technology, variations in digital literacy, and excessive online workloads that may contribute to learner fatigue and cognitive overload.

Despite these challenges, blended learning continues to gain recognition as an effective pedagogical approach for language education. Recent scholarship emphasizes that the success of blended learning depends largely on the quality of instructional design, particularly the balance between online and face-to-face components. In response to this need, the present study focuses on a more structured form of blended learning, the Enriched Virtual Model and examines its potential to enhance vocabulary learning through a multimodal, VARK-informed design.

The Enriched Virtual Model (EVM)

The Enriched Virtual Model represents a distinctive configuration of blended learning in which the majority of instructional content is delivered asynchronously through digital modules, while face-to-face meetings are scheduled strategically to support reinforcement, clarification, collaboration, and performance-based activities. Unlike the flipped classroom model, which typically retains regular weekly in-person sessions, EVM minimizes reliance on physical classroom time, making it particularly suitable for large classes and diverse learner populations (Staker & Horn, 2015).

Several features of EVM make it especially advantageous for vocabulary instruction.

Flexibility and self-paced learning

EVM enables learners to access and revisit online materials as needed, allowing them to regulate their own learning pace. This flexibility is essential for vocabulary learning, which depends heavily on repeated encounters and gradual consolidation of lexical knowledge.

Integration of multimodal content

Online modules within EVM can incorporate a wide range of resources, including videos, animations, audio recordings, interactive tasks, and hyperlinked readings. Such multimodal input supports multiple pathways for lexical processing and enables learners to engage with vocabulary through formats that align with their individual preferences, thereby increasing motivation and engagement.

Purposeful face-to-face reinforcement

Sessions in EVM have been structured for face-to-face interaction, where opportunities prioritize application, communicative use and collaborative problem-solving. These sessions also serve as opportunities for dialectical reflexivity; instead of simply commenting on what they have read online, these learners experiment with new vocabulary items within authentic and interaction-rich environments. As such, through discussions, role-plays, case-based tasks as well as peer collaboration students are encouraged to negotiate meaning, resolve misunderstandings and further refine lexical accuracy. Experiential vocabulary use is a critical component for building productive

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vocabulary knowledge because it promotes deeper semantic processing, contextual coherence, and retrieval practice. In doing so, EVM turns classroom meetings into opportunities for reinforcement through performance and ensures that online lexical input is both consolidated and becomes meaningful output in communicative practice.

Empirical evidence supports the effectiveness of EVM for vocabulary learning. Katasila (2022) demonstrated that EVM-based instruction in a Thai university context led to significant gains in both receptive and productive vocabulary, attributing these outcomes to the combination of structured online tasks and focused classroom interaction. Similarly, studies conducted in Indonesia suggest that EVM promotes learner autonomy and encourages more consistent engagement with digital materials (Sari & Utami, 2020).

However, despite its advantages, EVM requires careful instructional design and adequate scaffolding. Without clear guidance and well-organized materials, learners—particularly those unfamiliar with self-directed learning—may experience confusion or cognitive overload. Incorporating VARK-informed multimodal resources within EVM offers a potential solution to these challenges by addressing diverse learner preferences and supporting more inclusive engagement.

VARK learning styles framework

The VARK learning styles framework, which categorizes learning preferences into Visual, Aural, Read/Write, and Kinesthetic modalities, remains one of the most widely applied models for understanding learner diversity in higher education. Rather than prescribing rigid instructional matching, VARK serves as a practical guide for designing varied and inclusive learning materials that accommodate multiple ways of processing information.

Each modality contributes distinct pedagogical strengths. Visual learners benefit from diagrams, charts, maps, and color-coded representations; aural learners engage more deeply with spoken explanations, discussions, and auditory input; read/write learners prefer written texts, structured notes, lists, and definitions; and kinesthetic learners learn most effectively through hands-on activities, physical movement, and experiential tasks.

In the context of vocabulary learning, VARK-aligned instructional resources can support deeper semantic encoding and retention. Visual learners may associate new lexical items with mental images, while kinesthetic learners may anchor word meanings through embodied actions or simulations. Research suggests that instruction responsive to learner preferences can enhance motivation, confidence, and persistence in learning tasks (Abdullah & Omar, 2018). Accordingly, integrating VARK principles within a blended learning framework such as EVM offers a promising approach to creating more engaging and effective vocabulary instruction.

METHOD

This study employed a mixed-methods research design to comprehensively examine the effectiveness of integrating VARK learning styles within the Enriched Virtual Model (EVM) for the improvement of students' lexical

acquisition. The mixed-methods approach was selected because it enables the investigation of both measurable learning gains and the subjective learning experiences that underlie student engagement, thereby producing a more holistic understanding of the instructional model's impact (Creswell & Plano Clark, 2018). The research design consisted of a quantitative quasi-experimental component complemented by a qualitative phenomenological inquiry.

Research design

The quantitative component utilized a quasi-experimental one-group pretest-posttest design to measure shifts in lexical proficiency following the VARK-informed EVM intervention. This design was considered appropriate because the instructional groups formed naturally within the academic program, thus preventing random assignment. The qualitative component adopted a phenomenological approach to explore learners' perceptions and lived experiences as they interacted with multimodal instructional materials in a blended-learning environment. This dual design allowed the examination of both outcome-oriented and process-oriented dimensions of learning (Creswell, 2014).

Participants

The participants comprised 53 undergraduate students enrolled in the Lexical Studies course within the English Education Study Program at Universitas PGRI Semarang. Purposive sampling was employed to ensure the selection of learners directly involved in the instructional intervention and representative of various learning preferences. Learning-style identification was conducted using the VARK questionnaire. Participation was voluntary, and informed consent was obtained prior to data collection. The sample was appropriate for both quantitative measurement and qualitative exploration, enabling the triangulation of data sources.

Instruments

Vocabulary test

A researcher developed vocabulary test consisting of 40 items served as both the pre-test and post-test. The instrument assessed receptive and productive vocabulary knowledge aligned with the course syllabus. Content validity was established through expert review involving three specialists in English language education, while internal consistency reliability exceeded the acceptable threshold (Cronbach's $\alpha > .70$).

VARK learning style questionnaire

Learners' modal preferences (Visual, Aural, Read/Write, and Kinesthetic) were identified using the standardized 16-item VARK questionnaire. The instrument requires respondents to select options that best represent their preferred ways of processing and engaging with information in various learning situations. Each item allows multiple responses, reflecting the possibility that learners may demonstrate multimodal tendencies rather than a single dominant preference. The VARK framework has been widely validated and is frequently applied in

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language-learning research contexts to explore learner diversity and instructional alignment. In the present study, the questionnaire results were used to categorize participants into dominant modality groups for comparative analysis and to inform the design of multimodal instructional materials within the Enriched Virtual Model (EVM). The use of this instrument enabled a systematic identification of learner preferences, thereby supporting the examination of differential vocabulary gains across modality-based groups.

Qualitative instruments

Qualitative data were collected through weekly reflective journals documenting learners' engagement, challenges, and learning strategies. Additionally, semi-structured interviews were conducted with 12 purposively selected students representing diverse VARK profiles. Interview questions focused on students' perceptions of the multimodal materials, learning processes, and overall usability of EVM in supporting vocabulary development.

Procedure

The research was conducted over six weeks and consisted of four sequential phases.

Phase 1: Orientation and Baseline Assessment (Week 1).

Students were introduced to the Enriched Virtual Model (EVM), the learning management system, and expectations for multimodal participation. Informed consent was obtained. The vocabulary pre-test and the VARK questionnaire were administered to establish baseline proficiency and identify learners' modality preferences.

Phase 2: Online VARK-Informed Instruction (Weeks 2–4).

Students completed structured asynchronous modules aligned with VARK modalities. Each module integrated visual (infographics, videos), aural (audio explanations), read/write (digital texts, vocabulary logs), and kinesthetic (interactive tasks) components. Reflective journals were submitted weekly to document learning experiences.

Phase 3: Face-to-Face Reinforcement (Weeks 3–5).

In-person sessions focused on communicative application through discussions, collaborative tasks, and role-plays. These meetings aimed to strengthen productive vocabulary use and provide corrective feedback.

Phase 4: Post-Assessment and Qualitative Data Collection (Week 6).

Students completed the post-test to measure vocabulary gains. Reflective journals were collected, and semi-structured interviews were conducted with selected participants. Member checking was carried out to enhance qualitative credibility.

Orientation and initial data collection

Students were familiarized with the configuration of the Enriched Virtual Model (EVM), some functionality of the learning management platform, and expectations for multimodal engagement over the course. They made specific instructions on how to navigate through the online modules, how to submit

work, what involvement was necessary and how online and face-to-face components were combined. This orientation period was designed to ensure that students understood the instructional format and their roles in a blended-learning environment. The vocabulary pre-test to measure a baseline of lexical proficiency, then the VARK questionnaire was also given in order to identify learners' dominant modality preferences. Data collected during this phase were the basis for future grouping of instruction and data comparison.

Implementation of VARK informed EVM instruction

Instruction was delivered through a combination of asynchronous online modules and synchronous face-to-face sessions over a four-week period. The instructional materials were deliberately designed to align with the four VARK modalities to ensure multimodal engagement. Visual learners were supported through the use of mind maps, infographics, and animated videos that illustrated lexical relationships and contextual usage. Aural learners engaged with podcasts, pronunciation recordings, and audio explanations that reinforced phonological awareness and listening comprehension. Read/Write learners were provided with structured digital readings, analytical worksheets, and vocabulary journals that encouraged written reflection and lexical consolidation. Meanwhile, kinesthetic learners participated in simulations, interactive digital tasks, and role-play activities that promoted experiential learning and contextualized vocabulary application. This integrated multimodal design ensured that learners could process and practice vocabulary through diverse yet complementary channels. Students completed the online modules prior to attending the in-person consolidation sessions designed for discussion, practice, and clarification.

Post-test and qualitative data collection

At the end of Week 6, students completed the post-test to measure changes in lexical proficiency following the instructional intervention. The post-test was administered under conditions similar to the pretest to ensure comparability and consistency of measurement. Upon completion of the quantitative assessment, students submitted their reflective journals, which documented their learning experiences, challenges, and strategies throughout the six-week implementation. In addition, semi-structured interviews were conducted with purposively selected participants representing different VARK profiles. These interviews aimed to explore students' perceptions of the multimodal instructional design, their engagement with the Enriched Virtual Model (EVM), and the perceived impact of the intervention on their vocabulary development. The combination of test results, reflective writings, and interview data enabled a comprehensive evaluation of both learning outcomes and learner experiences.

Data validation and member checking

Preliminary qualitative findings were shared with interviewees to confirm accuracy, enhance credibility, and strengthen the trustworthiness of interpretations.

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Data Analysis**Quantitative analysis**

SPSS version 26.0 was used to analyze quantitative data. Then, a paired-sample t-test was performed in order to assess whether statistically significant differences existed between students' pre-and post-test vocabulary scores as the result of the intervention. This enabled the researchers to determine broad lexical growth subsequent to implementation of the VARK informed Enriched Virtual Model. Further, a one-way analysis of variance (ANOVA) was conducted for vocabulary gains among the four VARK learning-style groups which were based on modality preference: Visual, Aural, Read/Wright and Kinesthetic to determine whether differences due to modality preference were associated with differences in learning outcomes. For descriptive purposes and to help evaluate the practical significance of the instructional impact, effect size was calculated using Cohen's d in addition to hypothesis testing. These analyses were performed after testing for normality and homogeneity of variance to check whether these analytical procedures were appropriate.

Assumptions of normality and homogeneity of variance were examined to ensure the appropriateness of the statistical procedures.

Qualitative analysis

Qualitative data were analyzed using thematic analysis following Braun and Clarke's six-step procedure: data familiarization, initial coding, theme generation, theme review, theme definition, and reporting. Themes focused on learner engagement, cognitive processing, perceived challenges, and the role of VARK-aligned materials in facilitating learning within the EVM environment (Braun & Clarke, 2006).

Triangulation

Findings from quantitative and qualitative analyses were triangulated to enhance validity and produce a comprehensive interpretation of the instructional model's effectiveness. Triangulation allowed for convergence of evidence across data sources, strengthening the overall rigor of the study (Creswell & Clark, 2018).

RESULT AND DISCUSSION

The presentation of findings in this study integrates quantitative and qualitative results to provide a comprehensive understanding of how VARK-informed Enriched Virtual Model (EVM) instruction influenced students' lexical acquisition. The results are organized according to the research objectives, beginning with quantitative analyses that examine improvements in vocabulary mastery, followed by comparisons among VARK learning-style groups, and concluding with qualitative insights derived from reflective journals and interviews. Each set of findings is accompanied by an interpretive discussion to contextualize the results within existing theoretical frameworks and prior empirical studies, consistent with recommended mixed-methods reporting practices (Creswell & Plano Clark, 2018). The first set of findings focuses on determining whether the instructional intervention led to measurable gains in students' vocabulary performance from pre-test to post-test.

Vocabulary gains from pre-test to post-test

The first objective of the study was to examine whether VARK informed EVM instruction improved students' lexical acquisition. Table 1 presents the comparison of pre-test and post-test lexical scores.

Table 1. Pre-test and Post-test Lexical Scores

Measure	Pre-test (N=53)	Post-test (N=53)	Mean Difference	t-value	Sig.
Vocabulary Score (0–40)	22.47 (SD=3.91)	31.62 (SD=4.10)	9.15	18.42	.000

The results show a substantial increase in vocabulary scores after the intervention, with a mean gain of 9.15 points. The paired-sample t-test indicates that the difference is statistically significant ($p < .001$), suggesting that the VARK-informed EVM instruction produced a meaningful improvement in students' lexical competence. The effect size (Cohen's $d = 1.42$) reflects a large instructional impact, indicating that the intervention was pedagogically robust.

These findings align with scholarship asserting that multimodal exposure and spaced retrieval in online-first environments enhance vocabulary retention (Webb & Nation, 2017). The structure of the EVM—which allows learners to revisit materials independently—supports Nation's (2013) emphasis on repeated encounters for durable lexical acquisition. Thus, the first research objective is achieved: VARK-informed EVM instruction significantly improves lexical mastery.

Differences in outcomes across VARK learning styles

The second objective investigated score differences across learning style categories. Table 2 summarizes the post-test results based on VARK modality.

Table 2. Post-test vocabulary scores across VARK categories

Learning Style	N	Mean	SD
Visual	18	33.22	3.44
Aural	10	29.80	4.01
Read/Write	15	32.93	3.68
Kinesthetic	10	29.10	4.22

$ANOVA = 4.21, p = .010$

ANOVA results indicate a statistically significant difference among VARK groups ($p = .010$). Visual and Read/Write learners achieved the highest gains, whereas Aural and Kinesthetic learners showed more modest improvement.

For example, Visual and Read/Write learners seemed to benefit the most from the VARK-informed Enriched Virtual Model (EVM), mainly because of the number of visual supports and structured textual scaffolding incorporated in asynchronous online modules. The learning contents often represented infographics, diagrams and animated representations that could clearly illustrate the relationships between lexicons which helps those who learn best through pictorial representation and arrangements. Concurrently, the modules also provided a wealth of text via digital readings, guided worksheets and vocabulary journals that allowed Read/Write learners to take notes, reflect on

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their writing and analyze new lexical items. As such, this combination of visually rich content and structured written reinforcement gave rise to an instructional paradigm that was much more in tune with the cognitive profiles of these learner groups, leading to comparatively larger vocabulary gains.

This pattern resonates with Mayer's (2009) multimedia principle, which states that combining verbal and visual information enhances cognitive processing. Similarly, Fleming and Mills (1992) emphasize that Visual and Read/Write learners thrive in resource-rich environments with structured representations.

Kinesthetic learners, however, experienced fewer opportunities for embodied practice during online sessions—an issue commonly reported in blended-learning environments (Clinton-Lisell et al., 2024). Although face-to-face sessions included role-play and simulations, these were limited to periodic meetings, reducing the extent of kinesthetic engagement.

Thus, the second research objective is addressed: vocabulary gains differ across VARK categories, with Visual and Read/Write showing the highest improvement.

Learners' perceptions of the VARK-EVM model

Qualitative data were analyzed to understand learner engagement, challenges, and perceived benefits of the VARK-EVM integration.

Themes from reflective journals and interviews

Four major themes emerged from the qualitative analysis:

Theme 1: Increased engagement through multimodal resources

Students reported higher levels of engagement due to the availability of diverse media. Visual learners particularly appreciated infographics and mind maps, while Aural learners mentioned the usefulness of recorded explanations. One student commented:

"The images and animations made new words unforgettable. I remember them better because I can picture them." (Visual learner)

Aural learners valued pronunciation recordings, audio glosses, and podcasts because these resources allowed them to process vocabulary through listening and repeated exposure to spoken input, which aligns with their preferred mode of learning. Such auditory materials not only supported phonological awareness and accurate pronunciation but also facilitated deeper lexical encoding through sound-meaning connections. However, the request for more listening-based quizzes suggests that while passive exposure to audio was beneficial, learners also desired more interactive and assessment-oriented listening activities to reinforce retention and monitor their progress.

This pattern of responses indicates that engagement is strengthened when learners perceive alignment between instructional media and their cognitive preferences. The findings therefore lend support to Garrison and Vaughan's (2011) argument that learner engagement in blended environments increases when online modules integrate varied multimodal inputs. In this context, multimodal design did not merely diversify content delivery; it actively

enhanced participation by providing meaningful entry points for different learner profiles.

Theme 2: Strengthened autonomy and self-regulated learning

Learners noted that the structure of the EVM helped them manage time, revisit materials, and take control of their learning progress. This aligns with self-regulated learning theory (Zimmerman, 2002), suggesting that autonomy is vital for vocabulary development. Students emphasized that EVM allowed them to learn “at their own rhythm,” which reduced anxiety and improved motivation.

“I could pause, repeat, or go back anytime. This helped me understand difficult vocabulary without feeling rushed.” (Read/Write learner)

Self-paced learning supported deeper lexical processing as learners could manage their workload based on their schedules and preferences.

Theme 3: Cognitive clarity through structured modules

Students valued the clarity of the online lessons, which facilitated repeated exposure and deeper processing of vocabulary items. Many described the modules as “easy to navigate,” “clear,” and “well-organized,” reflecting good instructional design. Kinesthetic learners expressed limited engagement with online modules:

“I learn best when moving or doing things, but most online tasks were static. I liked the role-plays in class more than the online modules.” (Kinesthetic learner)

Although the LMS included interactive tasks and simulations, kinesthetic learners still preferred face-to-face, active learning tasks. Their lower mean gain scores support these observations.

Theme 4: Challenges related to workload and kinesthetic limitations

Several learners expressed challenges balancing online tasks with other coursework. Kinesthetic learners, in particular, felt that the online environment did not fully support their learning preferences, highlighting an area for instructional redesign. One learner stated:

“The online modules taught me the words, but I truly used them during the classroom games and discussions.”

This aligns with EVM principles, where online learning provides input, while face-to-face learning strengthens output.

The qualitative results reveal that the VARK–EVM framework generally enhances engagement, motivation, and learning effectiveness. However, modality imbalance particularly limited kinesthetic affordances remain a challenge.

Triangulated with the quantitative findings, these qualitative insights provide broader confirmation of the instructional model’s effectiveness. The very significant improvement shown in the quantitative analysis is substantiated by students’ comments and reflections which highlight greater engagement, better understanding of vocabulary items, as well as more confidence in applying new

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vocabulary. Combined, these strands of evidence suggest that the VARK informed EVM is overall effective in bolstering lexical acquisition.

At the same time, pooled data show that the model's benefits are not evenly distributed among learner groups. Despite the strong alignment between instructional materials and preferred processing modes reported by the Visual and Read/Write learners, reflected in their higher-than-average mean scores, Aural and especially kinesthetics learners exhibited lower levels of this type of alignment, corresponding with their more modest quantitative increases.

In addition, both the statistical trends as well as interview responses indicate increasing the kinesthetics component of instructional design can support a more equitable approach across identified learning styles. This book provides a framework for deliberately integrating these tools into our teaching practices, thus creating expanded opportunities for embodied interaction and task-based movement, as well as experiential digital activities to ensure that learners who rely on physical engagement are supported as effectively as those benefitted through more textual and visual modalities.

These findings contribute to the theoretical conversation around multimodal vocabulary instruction by demonstrating that multimodal design is most effective when modality representation is balanced.

Overall, the study demonstrates that VARK-informed EVM instruction substantially enhances lexical acquisition, with measurable gains across learner groups and strong positive perceptions from students. This suggests that EVM provides an effective platform for multimodal vocabulary instruction, consistent with the claims of blended-learning frameworks (Graham, 2013).

However, the observed variation across VARK categories indicates that instructional designers must ensure more balanced modality integration, especially for kinesthetic learners. This echoes recommendations from multimodal learning literature, which argues that instructional models must avoid over-relying on visual and textual modalities.

This study presents several significant theoretical implications. First, the findings demonstrate empirically that multimodal learning principles can be translated into practice within the context of an Enriched Virtual Model (EVM). The study offers clear evidence that the concept of multimodality has practical design implications capable of facilitating measurable lexical gains by embedding visual, aural, textual and experiential aspects within an online-first blended framework. Moreover, the results support claims that the design of learning according to learning styles can positively affect learner engagement and motivation, even if instruction is not tailored specifically to a single dominant preference. Instead of confirming a rigid one-to-one match, with the results indicating that diverse and flexible modalities are enabling an inclusivity that sets up the potential for richer interaction regarding vocabulary. These insights inform future iterations of blended-learning design in tertiary vocabulary instruction.

The findings of this study correspond closely with a wide body of previous research on vocabulary acquisition, multimodal learning, and blended-learning environments. First, the significant improvement in students' vocabulary scores

aligns with earlier studies indicating that blended and technology-supported instruction enhances lexical mastery by providing repeated exposure and flexible engagement with learning materials. Webb and Nation (2017) found that vocabulary learning is strengthened when learners have opportunities for iterative encounters and multimodal reinforcement—conditions that were achieved through the online-first structure of the EVM. Similarly, Tosun (2015) reported that blended vocabulary instruction leads to measurable gains in lexical retention, supporting the present finding that integrating online modules with in-person consolidation effectively deepens lexical processing.

The superior performance of Visual and Read/Write learners in this study also resonates with research on multimedia learning. Mayer's (2009) multimedia theory posits that learners process information more effectively when textual and visual stimuli are combined, which helps explain why learners with strong visual and textual preferences excelled in an environment rich with infographics, videos, and structured reading materials. These results are consistent with the findings of Clinton-Lisell et al. (2024), who observed that multimodal design disproportionately benefits learners whose preferences align with dominant instructional modalities. The pattern reported here further confirms Fleming and Mills' (1992) original claim that learning environments offering multiple sensory pathways improve engagement and comprehension, particularly for Visual and Read/Write learners.

In contrast, the comparatively lower performance of Kinesthetic learners echoes observations in prior studies that online learning environments often struggle to provide embodied, hands-on interaction. Research conducted by Albiladi and Alshareef (2019) and Ebadi & Rahimi (2018) similarly noted that kinesthetic learners may face challenges in digital learning settings due to limited opportunities for physical manipulation, movement, or experiential engagement. The present study reinforces these concerns by highlighting the need for more intentionally designed kinesthetic components within digital platforms to ensure equitable learning benefits across modalities.

Qualitative findings in this study also mirror earlier work showing that blended learning enhances learner autonomy, metacognitive awareness, and motivation. Garrison and Vaughan (2011) argued that blended environments foster deeper learning by encouraging self-regulation and reflective engagement, an effect also expressed by students in the current study, particularly those who appreciated the flexibility and clarity of the online modules. This is consistent with Zimmerman's (2002) framework of self-regulated learning, which emphasizes that autonomy and self-monitoring contribute substantially to academic development, including vocabulary learning.

Furthermore, the students' positive perceptions of the VARK-informed EVM model corroborate studies demonstrating that multimodal and learner-sensitive instructional designs improve engagement and satisfaction. Fitriani & Wibowo (2021), for instance, found that VARK-based instruction increased learners' motivation in EFL contexts by offering personalized pathways for processing information. The present results extend this line of research by showing that VARK-informed design remains effective when embedded within a structured blended-learning model such as EVM.

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Taken together, the findings of this study reinforce existing theoretical and empirical work suggesting that multimodal, blended, and learner-centered instructional approaches produce substantial gains in vocabulary acquisition. At the same time, the results also highlight gaps noted in prior studies, particularly the challenge of accommodating kinesthetic learners in digital spaces, thereby offering direction for future refinement of VARK-informed blended-learning designs. Overall, the convergence between this study and previous research strengthens the validity of the conclusions and underscores the continued relevance of multimodal design principles in contemporary EFL vocabulary instruction.

CONCLUSION

The present study demonstrates that integrating VARK learning styles within the Enriched Virtual Model meaningfully strengthens lexical acquisition by providing learners with multimodal pathways for processing and internalizing vocabulary. The instructional design effectively accommodates diverse learning preferences and fosters greater autonomy, engagement, and cognitive clarity, thereby addressing the research objectives concerning learning gains, variations across VARK profiles, and students' perceptions of the model. The study contributes to existing scholarship by showing how multimodal principles can be operationalized within an online-first blended framework, offering an innovative approach to lexical instruction in higher education. While the model supported most learners effectively, the findings also highlight the need for more balanced modality representation, particularly for kinesthetic learners whose needs were less fully met in digital environments. Future implementations may include more experiential and interactive kinesthetic activities integrated into the content and improved workload distribution to encourage sustained engagement. Nonetheless, certain limitations of the current study must be acknowledged. For instance, a one-group quasi-experimental design was used without having a control group and thus it is not possible to claim that any improvements can be attributed solely due the VARK-informed Enriched Virtual Model. Second, the research was set with one institution context under study and also limited sample size which might limit generalization of results into another higher education establishments. Third, the intervention duration was limited to six weeks and did not allow for the examination of whether vocabulary retention persisted over time and how impact of instruction is maintained. Also, learning-style category data were derived from self-reported questionnaire data, which might not encompass the dynamic and multidimensional characteristics of learner preferences. In spite of these constraints, the research contributes to knowledge on adaptive blended learning and offers practical guidance for designing multimodal vocabulary instruction that is responsive to the cognitive diversity of learners.

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AUTHOR STATEMENTS

Theresia Cicik Sophia Budiman was responsible for determining the substance of the article, data completeness, and compiling a narrative for research and discussion results. **Sri Wuli Fitriati** wrote an article according to

the template, arrange references, and ensure that the template is appropriate. **Widhiyanto** did the proofreading by paying attention to grammar, language completeness (grammar, diction, and vocabulary).

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