Exploring University EAP Students' Perceptions of a Prototype VR Learning Environment for Academic Writing Structure Learning

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Abstract. This paper explores how first-year university students enrolled in English for Academic Purposes (EAP) courses perceive a prototype immersive learning tool built in virtual reality (VR) for the purpose of developing academic writing structural awareness. Data were gathered from ten participants through Likert-scale surveys administered before and after engagement with the system, supplemented by individual interviews. Findings reveal generally favorable affective responses to the tool, though opinions regarding its instructional value diverged. A notable association emerged between participants' pre-existing dispositions toward EAP coursework and their subsequent evaluations of the VR-based tool ($r_s = .815$, $p = .004$). Participants credited the immersive quality of the experience with heightening their concentration and interest, yet ergonomic constraints—particularly visual strain and hardware discomfort—posed barriers to sustained engagement.

Keywords: Virtual Reality Learning Environment (VRLE); Writing Structure; Learner Perceptions; Computer-Assisted Language Learning (CALL)

1 Introduction

Over the past decade, immersive technologies have transitioned from recreational novelties to instruments with recognized pedagogical applications across disciplines [1]. Among these, VR stands out for its capacity to situate users within digitally constructed spaces that engage multiple sensory channels, offering learning affordances that conventional classroom settings cannot replicate [2]. In the domain of second language education, systematic reviews and quantitative syntheses have documented favorable outcomes associated with VR-mediated instruction across a range of linguistic competencies [3]. Nevertheless, writing—and academic writing structure in particular—has received scant attention in this line of inquiry. The handful of existing studies have deployed VR primarily to stimulate pre-writing ideation rather than to scaffold structural knowledge directly. Grounded in the notion that learners carry pre-formed affective orientations—termed antecedent conditions of the learner (ACL)—into any instructional encounter [4], this investigation pursues two objectives:

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first, to characterize how EAP students respond to a VR-based writing structure tool; and second, to assess whether those responses covary with the attitudes participants already hold toward EAP as a subject.

2 Relevant Concepts: Immersion, Presence, and VRLEs

Central to any pedagogical application of VR are the constructs of immersion, presence, and their educational implications. Immersion denotes the measurable, hardware-dependent properties of a system—display resolution, field of view, tracking fidelity—that collectively determine sensory envelopment [5]. Presence, by contrast, captures the user's subjective conviction of occupying the simulated space [6]. The Cognitive Affective Model of Immersive Learning (CAMIL) posits that these two constructs, together with learner agency, serve as the primary mechanisms through which VR influences cognitive and affective learning processes. Educational platforms leveraging these properties are commonly designated as Virtual Reality Learning Environments (VRLEs), spanning fully occlusive headset systems to screen-based three-dimensional interfaces [7].

3 Methodology

A prototype immersive application built on the Oculus Rift platform requires learners to assign color codes to sentences projected onto a virtual display board, with each hue corresponding to a rhetorical function, drawing from a library of thirty paragraphs and nine essays across three complexity tiers. Ten first-year EAP volunteers (equal gender split; aged 18–19) at same university participated, with six to twelve years of English study (mean: 9.5) and minimal prior VR exposure. A convergent mixed-methods protocol combined five-item pre-session and six-item post-session Likert-scale surveys with semi-structured interviews, all administered during weeks four and five of the academic term. Both instruments demonstrated strong internal consistency (pre: $\alpha = .897$; post: $\alpha = .932$). Composite scores were derived from mean item ratings, and participants were classified into unfavorable ($M < 3$, $n = 3$), moderately favorable ($3 \leq M < 4$, $n = 2$), and strongly favorable ($M \geq 4$, $n = 5$) disposition bands. A rank-order correlation assessed the disposition–evaluation association, and interview transcripts underwent two-pass thematic coding in NVivo 12 [8].

4 Results

4.1 Reliability

The Cronbach's alpha coefficient for the five pre-participation ACL items was .897, and for the six post-participation attitude items was .932, both well above the .70 acceptability threshold, indicating strong internal consistency for both instruments.

4.2 Pre-Participation ACL Descriptive Statistics

Table 1 presents the descriptive statistics for the five ACL items. Responses were polarized, particularly for items 4 and 5: while seven participants strongly agreed that academic writing is important for their present and/or future, three strongly disagreed. Items 1 and 2, measuring enjoyment of learning EAP, had the lowest means (both M = 3.10), indicating generally lukewarm attitudes toward the EAP learning experience.

Table 1. Descriptive Statistics for Pre-session Evaluation Items (n = 10)

Item	M	SD
1. Enjoyment of in-class EAP learning	3.10	1.287
2. Enjoyment of out-of-class EAP learning	3.10	1.197
3. Confidence in current EAP ability	3.40	1.430
4. Perceived utility of EAP	3.60	1.838
5. Perceived importance of academic writing	3.80	1.932

Note. Items rated on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree).

4.3 Post-Participation Attitude Descriptive Statistics

Table 2 summarizes participants' post-session evaluations. Willingness to re-engage with the tool received the strongest endorsement (M = 4.00), whereas the proposition that the tool would tangibly improve writing skills elicited the weakest agreement (M = 3.30), suggesting that experiential appeal did not automatically translate into perceived instructional value.

Table 2. Descriptive Statistics for Post-session Evaluation Items (n = 10)

Item	**M**	**SD**
1. Enjoyment of the VR experience	3.70	1.252
2. Perceived helpfulness for writing structure learning	3.60	1.174
3. Willingness to use the tool again	4.00	1.491
4. Willingness to recommend to peers	3.60	1.506
5. Perceived impact on writing improvement	3.30	1.059
6. Suitability for one-on-one tutoring	3.60	1.174

4.4 Correlation Between ACL and Post-Participation Attitude Scores

A rank-order correlation yielded a coefficient of .815 (p = .004), indicating that participants who entered the study with less favorable views of EAP tended to rate the VR tool less positively as well. Composite evaluation scores among the unfavorable disposition band ranged from 2.00 to 2.33, compared with 3.67 to 4.83 in the strongly favorable band. Given the modest participant count, this outcome is best regarded as preliminary evidence of a systematic trend rather than definitive proof [9]. The finding is therefore treated as exploratory and suggestive of a trend warranting further investigation rather than as confirmatory evidence.

4.5 Gender Differences

No statistically significant between-gender contrasts emerged for either disposition composites ($t(8) = .851$, $p > .05$) or evaluation composites ($t(8) = .642$, $p > .05$), with associated effect magnitudes falling in the small-to-medium range.

4.6 Semi-Structured Interview Results

A total of 74 positive and 26 negative comments were identified from the interview data. The most frequently cited positive responses related to the novelty and interest value of the VR experience. Five participants noted that the VRLE could increase motivation and willingness to study, particularly for students who are typically disengaged. Several participants reported that the fully occlusive nature of VR helped them focus by eliminating external distractions. The most common negative comments concerned discomfort from the VR headset, particularly for the seven participants who wore glasses and found it difficult to see text clearly. The strain of reading under suboptimal visual conditions caused fatigue for some users. A few participants expressed a preference for traditional pen-and-paper approaches due to the inability to take notes within the VRLE, as well as general unfamiliarity with the technology.

The following figures visualize the distribution of positive and negative interview comments across thematic categories.

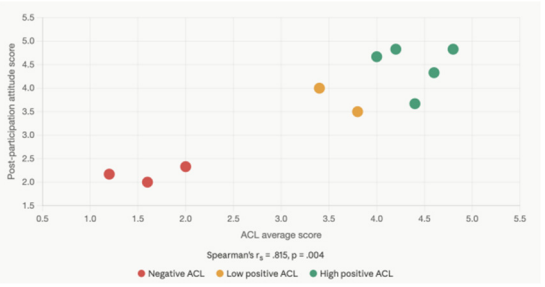

Fig. 1. Disposition composites versus post-session evaluation composites by learner group

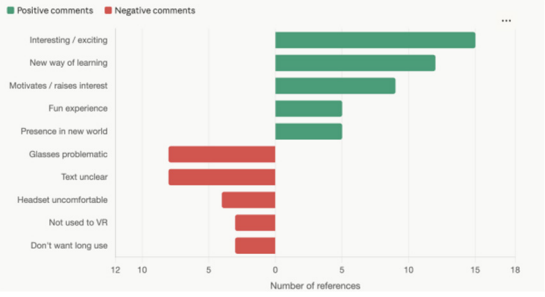

Fig. 2. Distribution of positive and negative interview comments by thematic category.

As shown in Figure 1 and Figure 2, the results demonstrate two key findings: (1) while participants generally enjoyed the VRLE, their perceptions of its pedagogical usefulness were divided; (2) learners' pre-existing attitudes toward EAP strongly predicted their attitudes toward the VRLE, as evidenced by the significant Spearman correlation (r_s =.815, p =.004).

5 Discussion

5.1 Students' Overall Attitudes Toward the VRLE

The results indicate that the majority of participants enjoyed using the VRLE—seven out of ten agreed they enjoyed the program, nine expressed willingness to use it again, and positive interview comments (74) substantially outnumbered negative ones (26), with the most frequent themes relating to novelty, interest, and fun. However, perceptions of pedagogical usefulness were more divided: the item "Students will improve their academic writing if they use this program" received the lowest mean score (M = 3.30), and only half would recommend the program to peers. This discrepancy between enjoyment and perceived usefulness echoes findings in the broader immersive learning literature, where affective gains frequently outpace perceived cognitive gains. A likely explanation lies in the physical discomfort reported by participants, as 20 of the 26 negative comments related to headset discomfort, difficulty seeing text, and problems wearing glasses—well-documented limitations of HMD-based VR [10]. It should be noted, however, that some of these issues, such as low pixel density and headset weight, are attributable to the hardware generation used and may be mitigated by recent advances in VR technology (Kaplan-Rakowski, 2025), while others, such as the inherent tension between extended reading and headset-induced strain in text-intensive tasks, represent more fundamental design challenges for VRLEs targeting writing instruction.

5.2 The Influence of ACL on VRLE Attitudes

The strong positive correlation between ACL scores and post-participation attitude scores (r_s = .815, p = .004) constitutes a central finding of this study: participants with negative pre-existing attitudes toward EAP consistently rated the VRLE less favorably, while those with positive attitudes reported more favorable experiences, aligning with L2 motivation research on the role of prior affective dispositions in shaping learning engagement [11]. However, given the small sample size, this finding should be treated as exploratory. This result carries implications for technology acceptance research, as previous studies on educational VR have typically focused on technology-related variables without accounting for learners' attitudes toward the subject matter itself; the present results suggest that content-related attitudes may be at least as influential, and future studies should incorporate ACL as a potential moderating variable. Moreover, these findings should be interpreted within the specific context of a transnational EMI university in China, where learner anxiety, teacher-centered norms, and face-saving values may inhibit active participation, and the motivational benefits observed may be

more pronounced among learners whose traditional classroom dynamics limit autonomous learning than in contexts that already emphasize learner autonomy.

6 Conclusion

This exploratory investigation examined how first-year EAP learners at same university responded to a prototype immersive tool designed for academic writing structure instruction. Two principal outcomes emerged. First, although affective engagement was largely positive—most participants described the experience as novel and stimulating—judgments of instructional value were notably more reserved, shaped in part by hardware-related visual strain and text legibility constraints. Second, participants' prior orientations toward EAP coursework bore a strong statistical association with their subsequent appraisals of the tool ($r_s = .815$, $p = .004$), indicating that subject-matter dispositions may function as an influential yet routinely overlooked variable in educational technology evaluation.

Several limitations must be acknowledged. The cross-sectional design precludes causal inferences, and the sample of ten participants, while acceptable for exploratory HCI research, limits the generalizability of the findings. Furthermore, the study used a single prototype VRLE; other systems with different designs may yield different results. The study also did not measure actual learning gains in writing structure, focusing instead on perceptions and attitudes.

Reference

1. Rojas-Sanchez, M. A., Palos-Sánchez, P. R., & Folgado-Fernández, J. A. (2023). Systematic literature review and bibliometric analysis on virtual reality and education. Education and Information Technologies, 28(1), 155–192.
2. Kaplan-Rakowski, R. (2025). Virtual reality–assisted language learning (VRALL). In L. McCallum & D. Tafazoli (Eds.), Springer.
3. Chen, Z., Zhang, Y., Zheng, C., Liang, J., & Cao, H. (2022). The effects of virtual reality-assisted language learning: A meta-analysis. Sustainability, 14(6), 3147.
4. Carpenter, C., Falout, J., Fukuda, T., Trovela, M., & Murphey, T. (2009). Helping students repack for remotivation and agency. In JALT2008 conference proceedings. JALT.
5. Makransky, G., & Petersen, G. B. (2021). The Cognitive Affective Model of Immersive Learning (CAMIL): A theoretical research-based model of learning in immersive virtual reality. Educational Psychology Review, 33(3), 937–958.
6. Slater, M., Sanchez-Vives, M. V., Banakou, D., Behr, K.-M., & Spanlang, B. (2022). Virtual reality as a tool in the social and behavioral sciences. Nature Reviews Methods Primers, 2, 86.
7. Lin, Y., Li, W., Yao, J., Yang, Q., & Zhang, L. (2024). The impact of virtual reality on student engagement in the classroom—A critical review of the literature. Frontiers in Psychology, 15, 1360574.
8. Saldaña, J. (2009). The coding manual for qualitative researchers. SAGE.
9. Larson-Hall, J. (2015). A guide to doing statistics in second language research using SPSS and R (2nd ed.). Routledge.

10. Moss, J. D., & Muth, E. R. (2011). Characteristics of head-mounted displays and their effects on simulator sickness. Human Factors, 53(3), 308–319.
11. Dörnyei, Z., & Ushioda, E. (2021). Teaching and researching motivation (3rd ed.). Routledge.