



Effects of a multimodal scaffolding module on business English reading comprehension in an EFL context

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ABSTRACT

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The growing demand for Business English (BE) skills in a globalised world has increased the importance of effective language instruction. Consequently, there is a need for teaching strategies that can improve the reading skills of English as a Foreign Language (EFL) learners. Traditional approaches to teaching English in an EFL setting may not cater to the different needs of learners in comprehending reading material. This study aims to explore the effectiveness of the multimodal scaffolding module in improving the reading skills of BE learners. This module is unique in integrating multimodal scaffolding with the Gradual Release of Responsibility (GRR) model to support BE reading. A quantitative pre-test-post-test quasi-experimental design was employed using convenience sampling. 192 first-year Business English students from a private college in China were recruited and divided into experimental and control groups. The intervention was conducted for 8 weeks, during which the experimental group received multimodal scaffolding instruction while the control group followed traditional methods. The results of the tests were analysed through descriptive and inferential statistics. The experimental group showed significantly greater improvement in reading comprehension scores and reduced reading barriers compared to the control group ($p < 0.05$). In addition, the intervention improved the ease of reading and the engagement of the learners. It was found that the multimodal scaffolding module is an effective teaching strategy that improves the cognitive and affective aspects of the learners. The study recommends integrating multimodal strategies into EFL instruction to improve learning outcomes in specialised contexts.

Contribution/Originality: The study contributes to the field of English as a Foreign Language (EFL) instruction by introducing and experimentally validating a multimodal scaffolding framework specifically designed for Business English reading comprehension. Multimodal learning theories and scaffolding principles have been incorporated into the multimodal scaffold, proving efficient in practice.

1. INTRODUCTION

Reading comprehension is a core skill in the English as a Foreign Language (EFL) learning process for specialised domains such as Business English (BE). Business English (BE) is one of the areas that requires reading comprehension. Through reading comprehension, learners can understand written English to access knowledge, work with disciplinary material, and engage effectively in international communication (Grabe & Stoller, 2019). In

the context of EFL, reading is not a simple receptive ability but a complex cognitive activity requiring the decoding, inferencing, and combination of existing knowledge (Elleman & Oslund, 2019). Particularly, in globalised educational and business settings, knowledge of written English is of great importance. Learners have to process specialised messages that contain domain-specific vocabulary and other complex constructions (Rohaizat & Aziz, 2021). For example, the students need to look into reports, contracts, messages, and proposals for processing business-specific documents. However, it causes difficulty for BE learners. That is, while it eliminates general linguistic competence, it also allows professional discourse. With English being the most popular language in global business communication, reading skills have become essential to BE students who want to achieve success at school and in business (Wu, 2023). As a result, an increase in reading comprehension is one of the primary goals of EFL teaching, specifically in such areas as Business English.

Despite the importance of reading comprehension, it is a major issue for EFL learners, particularly in the Chinese setting. Evidence suggests that Chinese students usually face the challenges of poor vocabulary, weak reading patterns, and a lack of exposure to natural English resources (Li, Tao, Joshi, & Xu, 2018; Zhang & Zhang, 2024). The difficulties are also compounded in BE courses, as the texts are more complex and require both language proficiency and knowledge of a specific field (Ngan & Chi, 2023). Chinese Business English students encounter several challenges, including linguistic, cultural, and strategic challenges (Wu, Budzenski, & Li, 2026). Consequently, they are unable to understand complex written texts. Linguistically, learners have problems with technical vocabulary and complex syntax; culturally, their lack of understanding is caused by unfamiliar situations and business behaviour. Strategically, many learners depend on word-by-word decoding rather than using global or metacognitive reading strategies.

China faces unique issues due to its approach to pedagogy. Furthermore, the classical methods of instruction in China, grammar-translation and teacher-centred instruction, have been labelled as those that do not allow students to be engaged and develop higher-order thinking abilities (Li et al., 2018). The latter can hardly meet the various learning needs of students while minimising the possibilities of interactive and meaningful engagement with texts. This can make learners develop passive reading habits and low levels of motivation and confidence.

Self-efficacy is another important variable that affects reading performance. The culture of low self-efficacy among Chinese EFL learners is usually related to reading anxiety and low performance (Jin, 2023; Luu, 2023). Bandura (2001) argues that beliefs about ability have a significant influence on the level of engagement and persistence shown by learners in learning activities. Thus, it contributes to a vicious cycle, contributing to poor understanding. Therefore, instructional strategies should focus on enhancing learners' understanding, confidence, and motivation.

To address these issues, the latest pedagogical advancement has focused on scaffolding and multimodal learning integration as means of enhancing reading comprehension. Scaffolding, based on the Sociocultural Theory of Vygotsky, is described as systematic assistance through which learners can accomplish tasks that are beyond their level but progressively advance to the level of completing tasks independently (McLeod, 2024). The technique is especially effective in EFL situations when students need instructions to handle complicated readings. Additionally, multimodal scaffolding provides an interactive learning process that facilitates various learning styles and lowers cognitive load because of its combination (Chang & Yang, 2023). It is the application of several semiotic resources, including visual, auditory, and textual ones, to aid the process of meaning-making. It offers systematic assistance by delivering different modes, such as visual tools, audio assignments, and interaction, which are gradually withdrawn as students gain sufficient expertise.

Empirical research has shown that multimodal instruction can help learners understand the English language better by inducing more interest and motivation (Jiang & Luk, 2016; Putri, Rahmawanti, & Djamdjuri, 2025). This is because it includes more contextual clues and interaction with the learning process. In terms of BE, multimodal scaffolding might assist learners in decoding difficult texts, learning specialised terms, and relating the linguistic input to the business environment. Nonetheless, there is a significant gap in the issue of their combined use in Business English EFL, especially in China. Available research has mainly concentrated on general EFL contexts or has studied

scaffolding and multimodality as independent variables (Jiang & Luk, 2016; Xu, 2024). Furthermore, a range of studies fail to consider the particular issues related to BE, including vocabulary specific to the domain, professional lingo, and time limitations. Also, as much as technology-enhanced language learning is becoming popular, it has not been well applied in theory-centred, structured instructional models in BE contexts. Thus, this study explored the applicability of an adaptive multimodal scaffolding module in promoting reading comprehension in Business English learners in a Chinese private college setting.

Even though there is considerable literature about reading comprehension, scaffolding, and multimodal learning, prior investigations in this area have been lacking. These three components of learning have been studied separately without considering the instructional strategies that integrate them into one cohesive process (Ngan & Chi, 2023). Additionally, the role of multimodal scaffolding within the realm of Business English (BE) learning has not received the deserved amount of attention despite the unique difficulties associated with the acquisition of subject-specific vocabulary and business discourse. In other words, there are currently insufficient data on the impact of multimodal scaffolding on reading comprehension and self-efficacy among Chinese learners of Business English. Therefore, this study aimed to understand the effectiveness of a multimodal scaffolding module in improving Business English reading comprehension among EFL learners. In particular, its research objective was as follows:

RO: To study the effectiveness of a multimodal scaffolding module in improving Business English reading comprehension among EFL learners at a private college in China.

Subsequently, the hypothesis determined in this study was as follows:

H₁: The multimodal scaffolding module can improve reading efficiency more than the conventional method among EFL learners at a private college in China.

H₂: The multimodal scaffolding module can improve self-efficacy more than the conventional method among EFL learners at a private college in China.

The research particularly aimed at exploring the obstacles to reading, assessing the self-efficacy of learners, and establishing the effect of multimedia scaffolding on learning outcomes. Subsequently, the study conducted a quasi-experimental pre-test and post-test study on BE students. Thereby, it would serve as an important resource for educators, curriculum designers, and policymakers who need to enhance EFL reading teaching in specialised settings.

2. LITERATURE REVIEW

2.1. Reading Comprehension in EFL Contexts

Reading comprehension in EFL settings has been viewed as a complex and dynamic process. Grabe and Stoller (2019) noted that comprehension of written text requires the integration of bottom-up and top-down processes. Simultaneously, comprehension of written text is not a unidimensional skill but a multidimensional construct that is influenced by learners' vocabulary knowledge, working memory capacity, and inferencing skill (Elleman & Oslund, 2019). Thereby, reading comprehension involves the interplay of the learner's linguistic knowledge, cognitive processes, and sociocultural factors. However, within the context of EFL settings, the primary cause of reading comprehension difficulties has been attributed to learners' poor vocabulary knowledge and lack of exposure to authentic materials (Jiang & Luk, 2016; Yan & Kim, 2023). Additionally, the syntactic complexity of the text increases learners' cognitive load (Al Hakim & Widyahening, 2025). On the other hand, studies recognised that vocabulary knowledge is the strongest predictor of reading comprehension (Moghadam, Zainal, & Ghaderpour, 2012). This suggests that EFL learners also need to develop strategic skills for effective comprehension. In the case of BE learners, the comprehension task is more cognitively demanding because they are exposed to technical vocabulary and discourse structure.

Research suggests that BE learners need to process linguistic and domain information simultaneously (Penyang & Aji, 2025). However, it puts greater cognitive demands on students. This understanding can be drawn based on Cognitive Load Theory, which suggests that high cognitive demands will negatively impact comprehension (Sweller,

2011). Moreover, metacognitive awareness has been identified as a significant construct in reading comprehension success (Soto et al., 2023). Chinese EFL learners generally lacked strategic awareness and relied on passive decoding strategies (Zhang, 2003). However, it is significant to note that although previous research has identified linguistic and cognitive influences on reading comprehension success, it has generally neglected affective influences. In contrast, Bandura (2001) suggested that learners' perceptions of their capabilities have a significant impact on success in a learning task. Therefore, it is suggested that reading comprehension is a multidimensional construct that incorporates cognitive, linguistic, and affective aspects. Subsequently, addressing the reading comprehension barriers would help in improving reading comprehension.

2.2. Self-efficacy and Reading Barriers

Self-efficacy and reading barriers are well-known factors that determine reading comprehension in EFL situations. The empirical evidence has continuously revealed that learners who have high self-efficacy in reading are more effective in terms of their comprehension and strategic reading (Ngan & Chi, 2023). Bandura (2001) defines self-efficacy as learners' belief regarding their capability to perform certain tasks that directly affect their effort, perseverance, and performance. Conversely, reading barriers, including vocabulary restrictions, syntactic difficulties, and inefficient use of strategies, are major obstacles to comprehension (Al-Jarrah & Ismail, 2018). Notably, previous studies indicate that there is a relationship between self-efficacy and reading barriers; learners with higher self-efficacy can better cope with reading difficulties. Since they are quantifiable and result-focused, these constructs are often tested with the help of quantitative methods. Thus, this quantitative research evaluates the change in reading performance through reading barriers as a latent factor to determine learning outcomes.

Recent studies conceptualise the barriers to reading in terms of the use of metacognitive strategies. Mokhtari, Dimitrov, and Reichard (2018) created the Metacognitive Awareness of Reading Strategies Inventory (MARS), which classifies reading strategies in three domains: Global Reading Strategies (GLOB), Problem-Solving Strategies (PROB), and Support Strategies (SUP). These categories indicate the capacity of learners to organise, control, and aid understanding processes, and weaknesses in such areas are commonly expressed in the form of barriers to reading. Similarly, self-efficacy in reading is multidimensional, which includes reading self-efficacy, task self-efficacy, and self-regulatory efficacy (Koşar, Akbana, & Yakar, 2022; Prat-Sala & Redford, 2010). These models provided a conceptual foundation to quantitatively evaluate the reading problems and performance of learners.

2.3. Scaffolding in Reading Instruction

The concept of scaffolding has also proven useful as an effective strategy for EFL learners' reading comprehension. The use of scaffolding is also effective in the instruction of EFL learners, as it can improve learners' reading comprehension (Bakhtiari Moghadam, Narafshan, & Tajadini, 2023; Pérez, 2024). For example, the use of questioning can help learners read more critically. It aligns with the theory of sociocultural learning, where scaffolding is defined as the temporary support given by a more knowledgeable other for learners' performance of tasks within their Zone of Proximal Development (ZPD) (McLeod, 2024). It focuses on the gradual removal of support as learners become more independent. Various research studies have proven the effectiveness of the use of scaffolding in the improvement of EFL learners' reading comprehension. The use of scaffolding is effective in the development of learners' language (Teng, 2023). It bridges the gap between learners' existing knowledge and target knowledge. Similarly, Van, Volman, and Beishuizen (2010) note that effective scaffolding is contingent, fading, and transfers responsibility. In the context of BE learning, learners must process complex texts that require both linguistic and content-related expertise. Therefore, it can be inferred that scaffolding may be helpful in assisting learners in decoding technical vocabulary and discourse patterns. However, despite its benefits, traditional scaffolding methods have been criticised for being overly dependent upon teaching methods and techniques. This may limit autonomy and opportunities for interactivity between learners and teachers (Walqui, 2006). Thus, scaffolding research has

conceptualised it as a static process instead of a flexible and adaptive one. Subsequent application of it can decrease the barriers to reading comprehension.

2.4. Multimodal Learning in Language Education

Evidence provides an understanding of multimodal learning in language education. Multimodality is the use of multiple modes of sign-making, such as visual, auditory, and textual modes, to derive meaning (Kress, 2009). It aligns with the Cognitive Theory of Multimedia Learning, which states that learners process information more effectively through multiple modes of representation (Mayer, 2024). Apart from the theoretical basis, empirical evidence shows that using multiple modes, such as visuals and text, is effective for learning vocabulary (Teng, 2023). Using multiple modes is effective because it creates a richer learning environment, accommodating different learning styles. Thus, using a multimodal approach is beneficial, especially in EFL learning. In BE, using a multimodal learning approach can offer contextual support to learners to help them better understand complex texts. Thereby, learners can use visual aids such as diagrams of business processes or audio materials explaining business terminology. However, ineffectively designed multimodal learning materials have been shown to cause cognitive overload and impede learning outcomes (Sweller, 2011). Therefore, it is important to note that the success of multimodal learning is dependent upon its design and delivery. Hence, although multimodal learning has shown promising results in various studies, it is important to note that most such studies have concentrated more on the technological aspects of multimodal learning and not on its integration into learning theories.

2.5. Research Gap

While there have been many studies conducted on reading comprehension in EFL settings, most studies tend to focus more on linguistic and cognitive aspects while ignoring the role of learners' emotions, such as self-efficacy, in the learning process (Elleman & Oslund, 2019; Soto et al., 2023). On the other hand, despite being widely recognised as an effective pedagogical approach, scaffolding is typically regarded as a constant process that relies heavily on the instructor (Van et al., 2010). Although multimodal learning has proven its effectiveness in engaging students and minimising cognitive overload, it has received little attention in the context of scaffolding (Mayer, 2024; Teng, 2023). Moreover, few studies have investigated these pedagogical strategies in relation to Business English classes, which are unique in their way (Ngan & Chi, 2023). Thus, there was a need to develop strategies to improve EFL among students involved in BE.

2.6. Framework in the Study

The conceptual framework of this study incorporates the concept of scaffolding to promote EFL reading comprehension. It is founded on the Gradual Release of Responsibility (GRR) Model, which focuses on the shift from teacher-led learning to self-directed learning (Pearson, McVee, & Shanahan, 2019). It comprises four stages: modelling, or "I do"; guided learning, or "We do"; collaborative learning, or "You do together"; and independent learning, or "You do alone." This process is closely related to the concept of scaffolding, as it supports learners' progress towards mastery. Within this context, visual aids can be used during modelling, while collaborative learning can be facilitated through interactive activities. This study is related to both cognitive and affective aspects of learning, where learners not only benefit from learning support, but their self-efficacy is also promoted.

This study was based on three main theoretical perspectives to provide a comprehensive understanding of how multimodal scaffolding can impact both reading comprehension and self-efficacy development in EFL learners. Firstly, Constructivist Theory emphasises learner engagement in learning as a prerequisite to knowledge construction (Fosnot, 2013). This study is informed by this concept, which emphasises learner-environment interaction as a prerequisite for learning. Secondly, the Sociocultural Theory of learning emphasises the significance of social interaction in learning (McLeod, 2024). This study is informed by the concept of scaffolding, which is

grounded in the Zone of Proximal Development (ZPD). Finally, Social Cognitive Theory emphasises learner self-efficacy as a prerequisite for learning (Bandura, 2001). This study is informed by this concept, which emphasises learner engagement in learning as a prerequisite to learning. The integration of these theories provided a comprehensive understanding of how multimodal scaffolding can impact both reading comprehension and learner self-efficacy development in EFL learners.

3. METHODOLOGY

3.1. Research Design

A quantitative pre-test/post-test quasi-experimental design was used in this study to assess the efficacy of the multimodal scaffolding module in enhancing the English reading comprehension skills of BE learners. Quasi-experimental design is widely recognised as an effective methodology for establishing relational trends between the interventions used in the classroom and the learning outcomes (Creswell & Creswell, 2017). The experimental pre-test and post-test design allowed for obtaining changes in improvement or degradation among the students following the intervention. Figure 1 illustrates the research design followed in the study. As shown in the figure, there were two groups in the study: the experimental group (EG), which was subjected to instruction using the multimodal scaffolding module, and the control group (CG), which was subjected to the traditional teacher-centred approach. The same pre-test and post-test were used for both groups to assess the changes in the reading comprehension performance of the participants. The design was based on the pre-test/post-test quasi-experimental design to establish whether the use of the multimodal scaffolding module had a statistically significant impact on the reading comprehension performance of the participants.

3.2. Research Setting and Participants

The study was carried out in a private college in China that offered a Business English program in the EFL setting. The participants were undergraduate students in the first year of the Business English program. This setting reflected the EFL classroom in Chinese schools, in which English language instruction is unable to meet the varied needs of students, including reading issues. Convenience sampling was used as the sampling procedure. Firstly, random sampling was not feasible since the restricted availability of participants was limited to intact classes provided by the institution. Second, the administrative policy limited the reorganisation of the students into new groups, since the schedules of the classes and structures of courses were already determined. Third, the academic semester was not a feasible time frame to recruit participants across cohorts or institutions. These limitations led to the conclusion that the most suitable and viable approach to undertaking the experimental study was convenience sampling to ensure ecological validity.

Although convenience sampling was used, efforts were made to make the groups comparable. The sample consisted of students with the same level of academic background, all of whom had previously studied English courses. Their English language proficiency was identified as being at an intermediate level according to the institutional assessment criteria, which guaranteed a relatively homogeneous sample for carrying out the study.

3.3. Intervention Design: Multimodal Scaffolding Module

The intervention implemented in this study was a multimodal scaffolding module designed to support students' reading comprehension through structured and interactive learning activities. The module was developed based on scaffolding principles and integrated multiple modes of instruction, including textual, visual, and auditory elements. It was based on multimodal scaffolding, conceptualised as a structured support system that gradually reduces assistance as learners develop independence.

The intervention was conducted over a period of 8 weeks, during which the experimental group engaged with reading materials supported by multimodal resources. These included:

- Visual aids (diagrams, charts, and images) to support comprehension of complex texts.
- Audio explanations that clarify vocabulary and concepts.
- Interactive activities to promote engagement and active learning.
- Annotated texts guide learners' attention to key information.

The instructional design followed the Gradual Release of Responsibility (GRR) model, as shown in Table 1. This structured progression ensured that learners received sufficient support while gradually developing autonomy. In contrast, the control group received traditional instruction, which primarily involved textbook-based reading and teacher explanations without multimodal support.

The teaching and learning procedures were carried out in accordance with the GRR paradigm over the eight weeks. The first stage (weeks 1-2) involved modelling reading strategies through the use of multimodal materials, such as annotated reading materials and visual materials, by the instructor. Guided practice took place from weeks 3-4, whereby learners undertook reading tasks under the guidance of the teacher, together with interactive discourse. Collaboration was initiated from weeks 5-6, when students worked on analysing Business English reading materials in groups through multimodal means. Finally, from weeks 7-8, learners undertook reading tasks independently, employing the strategies that had been learned earlier. Additionally, to ensure instructional consistency, both groups followed the same syllabus, learning objectives, and reading materials, with the only variation being the instructional approach. This approach isolated the effect of the multimodal scaffolding intervention.

Table 1. Instructional design.

Modelling ("I do")	The instructor demonstrated reading strategies using multimodal support
Guided Practice ("We do")	Students practised reading with teacher guidance
Collaborative Learning ("You do together")	Students worked in groups to analyse texts
Independent Practice ("You do alone")	Students applied strategies independently

3.4. Instruments

3.4.1. Reading Comprehension Test

The primary instrument used in this study was a reading comprehension test, designed to measure students' ability to understand Business English texts. The test was adapted from the Business English Certificate (BEC) Preliminary Reading component, which is widely recognised for assessing reading proficiency in professional contexts. The test consisted of multiple-choice questions and comprehension tasks that required students to identify main ideas, infer meaning, and interpret textual information.

3.4.2. Validity and Reliability

To ensure content validity, the test items were aligned with the learning objectives of the BE reading course and reviewed by subject experts, that is, teachers experienced in business English. The test also reflected authentic business contexts, enhancing its relevance and applicability. Reliability was assessed using internal consistency measures, such as Cronbach's alpha, to ensure that the instrument produced consistent results. Standardised test conditions were maintained during both pre-test and post-test administrations to minimise measurement error.

Exploratory Factor Analysis was conducted with Principal Component Extraction, Varimax Rotation, and Kaiser Normalisation. Table 2 shows that all items loaded on the intended latent variable with acceptable factor loadings ($FL > 0.5$). This indicates that all items are adequate to represent the latent variables of Reading Barrier and Self-Efficacy. The validity of these two scales is acceptable ($AVE > 0.5$), with very high composite reliability ($CR > 0.95$) and very high internal consistency (Cronbach's Alpha > 0.967).

Table 2. Rotated Factor Matrix with Reliability and Validity Analysis.

	Component Factor Loadings		AVE	CR	Cronbach's Alpha
	SE	RB			
RB1		0.504	0.519	0.965	0.967
RB2		0.515			
RB3		0.537			
RB4		0.541			
RB5		0.555			
RB6		0.758			
RB7		0.687			
RB8		0.749			
RB9		0.700			
RB10		0.770			
RB11		0.682			
RB12		0.681			
RB13		0.715			
RB14		0.831			
RB15		0.598			
RB16		0.700			
RB17		0.741			
RB18		0.749			
RB19		0.763			
RB20		0.818			
RB21		0.710			
RB22		0.802			
RB23		0.678			
RB24		0.822			
RB25		0.751			
RB26		0.784			
RB27		0.777			
RB28		0.677			
SE1	0.773		0.618	0.975	0.977
SE2	0.800				
SE3	0.837				
SE4	0.870				
SE5	0.860				
SE6	0.774				
SE7	0.856				
SE8	0.845				
SE9	0.809				
SE10	0.838				
SE11	0.812				
SE12	0.833				
SE13	0.767				
SE14	0.764				
SE15	0.830				
SE16	0.666				
SE17	0.699				
SE18	0.752				
SE19	0.816				
SE20	0.749				
SE21	0.748				
SE22	0.567				
SE23	0.789				
SE24	0.741				

Note: Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalisation; rotation converged in 3 iterations.

3.5. Data Collection

The collection of data was conducted in three stages. In the first phase, both the experimental and control groups were administered a pre-test to assess their baseline reading comprehension levels. This ensured comparability

between groups before the intervention. In the second phase, the experimental group received instruction through the multimodal scaffolding module, and the control group continued with traditional teaching methods. To ensure consistency, both groups were taught by the same instructor and covered similar reading materials, with the only difference being the instructional approach. In the third phase, both groups completed the same reading comprehension test as a post-test. The results were used to measure improvements in reading performance and evaluate the effectiveness of the intervention.

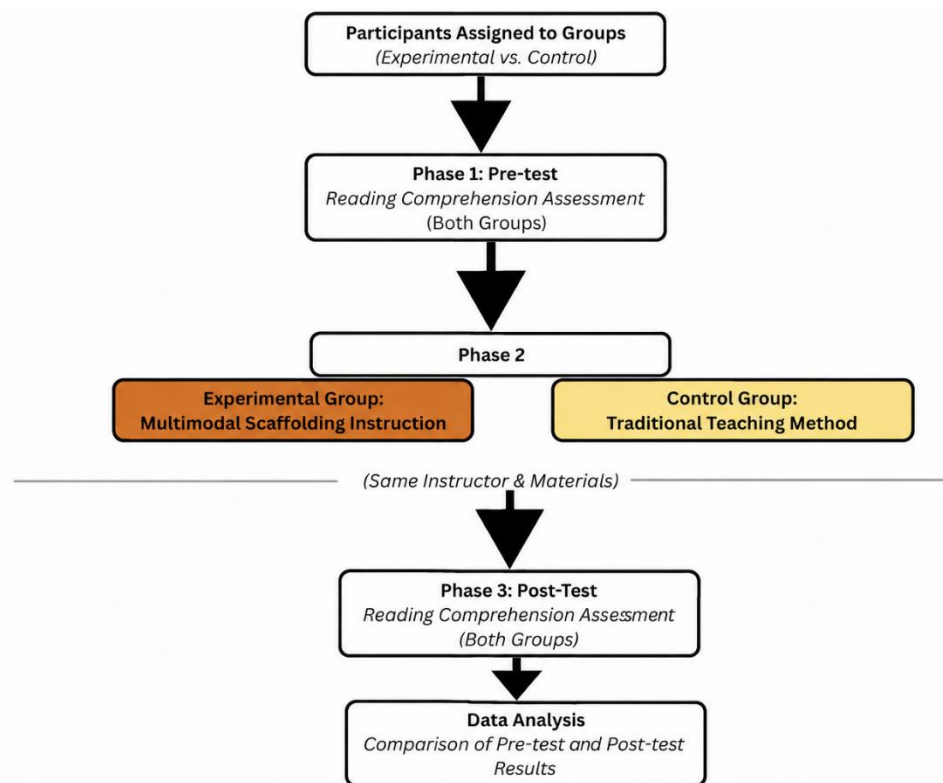


Figure 1. Data Analysis Procedure.

Note: Both groups were taught by the same instructor and used similar reading materials to ensure consistency.

3.6. Data Analysis

The collected data were analysed using statistical methods to determine the effectiveness of the multimodal scaffolding intervention. Data analysis was conducted using statistical software such as SPSS. Repeated-measures ANCOVA was used to answer the research question.

3.7. Ethical Considerations

Ethical considerations were carefully addressed throughout the study. Participants were informed about the purpose of the research and provided informed consent before participation. Participation was voluntary, and students had the right to withdraw at any time without penalty. Confidentiality was maintained by anonymising participants' data and ensuring that individual responses were not disclosed. Additionally, institutional approval was obtained before conducting the study.

4. RESULTS

4.1. Demographic, Descriptive Details, Baseline Group Equivalence Testing and Control Variables

According to Table 3, of the total 192 participants, 23.96% are male, and only 76.04% are female. The distribution is almost similar in both the Multimodal Scaffolding Module group and the Traditional learning group, and there is

no significant difference (Chi-square = 0.457, $p = 0.612$) between the two groups. Around 95.83% of the participants are 18 to 24 years of age in both groups, and therefore, the groups are age-homogeneous.

Table 3. Demographic Characteristics of the Participants.

Variables	Category	Traditional		Experimental (MSM)		Total		Chi-square	Sig.
		Count	Column N %	Count	Column N %	Count	Column N %		
Gender	Male	25	26.04%	21	21.88%	46	23.96%	0.457	0.612
	Female	71	73.96%	75	78.13%	146	76.04%		
Age	Less than 18 years	4	4.17%	4	4.17%	8	4.17%	0.001	0.99
	18 to 24 years	92	95.83%	92	95.83%	184	95.83%		

As per Table 4, around 44.79% of the participants had a low level of English proficiency before joining this course, and around 41% of the participants had an interest in learning English, whereas 36.98% of participants were somewhat interested in learning English. The distributions are almost similar in both the Traditional and Multimodal Scaffolding Module learning groups. Around 58% of total participants had engagement with English materials at least once or twice a month to once or twice a week, whereas around 39% of total participants were rarely engaged with English learning materials before the course; 44.79% in the MSM group and 33.33% in the Traditional group had rare engagement with English learning materials.

Table 4. English Proficiency, Interest and Engagement of Participants.

Variables	Category	Traditional		Experimental (MSM)		Total	
		Count	N %	Count	N %	Count	N %
English Proficiency	Low	45	46.88%	41	42.71%	86	44.79%
	Intermediate	51	53.13%	55	57.29%	106	55.21%
Pre-Interest	Very Interested	6	6.25%	3	3.13%	9	4.69%
	Somewhat Interested	31	32.29%	40	41.67%	71	36.98%
	Neutral	51	53.13%	43	44.79%	94	48.96%
	Not Very Interested	7	7.29%	7	7.29%	14	7.29%
	Not at All Interested	1	1.04%	3	3.13%	4	2.08%
Pre-Engagement	Several Times a Week	4	4.17%	1	1.04%	5	2.60%
	Once or twice a week	26	27.08%	25	26.04%	51	26.56%
	Once or twice a month	29	30.21%	24	25.00%	53	27.60%
	Rarely	32	33.33%	43	44.79%	75	39.06%
	Never	5	5.21%	3	3.13%	8	4.17%

4.2. Comparing the Difference between the Experimental and Control Groups and Hypothesis Testing

As per the descriptive analysis, Age and Gender are almost equally distributed within both the MSM and Traditional groups (Table 3), whereas there is no evidence of a confounding effect of age and gender on English learning according to the literature. However, the pre-interest and pre-engagement of the students with learning can influence their English learning outcomes, and a marginal difference between the MSM and Traditional groups is noticeable in pre-interest and pre-engagement. Therefore, the pre-interest and pre-engagement variables are taken as covariates in the following repeated-measures ANCOVA analysis, considering their possible confounding effect.

Table 5 presents the observed and covariate-adjusted descriptive statistics for Reading Barrier and Self-Efficacy across the experimental and control groups at pre-test and post-test.

Table 5. Observed and Estimated Descriptive Results.

Measure	Exp/Con	Time	Observed		Covariates Adjusted Estimate			
			Mean	SD	Mean	SE	95%CI	
							LB	UB
Reading Barrier	Traditional	Pre	3.324	0.539	3.317	0.053	3.213	3.421
		Post	3.213	0.495	3.206	0.05	3.108	3.304
	MSM	Pre	3.278	0.565	3.285	0.053	3.181	3.389
		Post	3.054	0.543	3.062	0.05	2.964	3.16
Self-Efficacy	Traditional	Pre	2.740	0.451	2.752	0.048	2.659	2.846
		Post	2.809	0.424	2.819	0.046	2.729	2.909
	MSM	Pre	2.819	0.568	2.807	0.048	2.713	2.901
		Post	3.264	0.534	3.253	0.046	3.163	3.344

Note: Covariates appearing in the model are evaluated at the following values: Pre-Interest = 2.65, Pre-Engagement = 3.16.

The repeated-measures ANCOVA model includes T (Time) as a factor and Group (Experimental = MSM and Control = Traditional) as a grouping variable, where T = 1 is the pre-test and T = 2 is the post-test. This study is focused on univariate ANCOVA results to find the effect of the intervention on each dependent variable, namely Reading Barrier and Self-Efficacy.

Table 6. Univariate Results of Repeated Measures ANCOVA.

Effect Type	Source	Measure	df	Mean Square	F	Sig.	Partial Eta Squared
Between Subject Effects	Intercept	Reading Barrier	1	356.249	725.166	0.000	0.794
		Self-Efficacy	1	98.35	244.453	0.000	0.565
	PreInterest	Reading Barrier	1	6.771	13.782	0.000	0.068
		Self-Efficacy	1	3.286	8.167	0.005	0.042
	PreEngagement	Reading Barrier	1	2.172	4.42	0.037	0.023
		Self-Efficacy	1	5.97	14.839	0.000	0.073
	Group	Reading Barrier	1	0.738	1.502	0.222	0.008
		Self-Efficacy	1	5.697	14.161	0.000	0.070
	Error	Reading Barrier	188	0.491	-	-	-
		Self-Efficacy	188	0.402	-	-	-
	T	Reading Barrier	1	0.273	24.645	0.000	0.116
		Self-Efficacy	1	0.923	64.06	0.000	0.254
Within Subject Contrast	T * PreInterest	Reading Barrier	1	0.017	1.563	0.213	0.008
		Self-Efficacy	1	0.024	1.69	0.195	0.009
	T * PreEngagement	Reading Barrier	1	0.000	0.005	0.944	0.000
		Self-Efficacy	1	0.058	4.006	0.047	0.021
	T * Group	Reading Barrier	1	0.303	27.373	0.000	0.127
		Self-Efficacy	1	3.431	238.258	0.000	0.559
	Error(T)	Reading Barrier	188	0.011	-	-	-
		Self-Efficacy	188	0.014	-	-	-

Note: Computed using alpha = 0.05.
Transformed Variable: Average.

As per Table 6, the between-subject effects indicated that there is a significant difference between the experiment and control groups for self-efficacy ($F = 14.161$, $p < 0.05$), irrespective of pre-test or post-test, whereas the effect size is low (Partial Eta Square = 0.070). The within-subject effect in Table 6 and Figure 2 indicates that there is a significant effect of T on both outcome variables. It signifies that the difference between pre-test and post-test results is significant for both MSM and Traditional Groups in terms of Reading Barrier ($F = 24.645$, $p < 0.05$) and Self-Efficacy ($F = 64.06$, $p < 0.05$). The changes in both groups from pre-test to post-test for Self-Efficacy (partial eta square = 0.254) are larger than those for Reading Barrier (partial eta square = 0.116). Considering the fact that the results indicated that the effect in both the control and experiment groups is significant, the next evaluation is about whether the changes in the experiment group are significantly different from those in the control group.

As per the within-subject contrast of Table 6, the interaction term of Time and Group (T*Group) has a significantly strong effect on Self-Efficacy ($F = 238.258$, $p < 0.05$, eta square = 0.559), and a significantly moderate effect on Reading Barrier ($F = 27.373$, $p < 0.05$, partial eta-square = 0.127). It indicates that the changes from pre-test to post-test in both Reading Barrier and Self-Efficacy significantly differ between the MSM group and the Traditional Group, whereas the difference in Self-Efficacy is larger than that in Reading Barrier. Besides, the effect of the intervention is stronger on Self-Efficacy than on the Reading Barrier, where the effect is strong on Self-Efficacy and the effect is moderate on the Reading Barrier. Therefore, both Hypotheses H1 and H2 are accepted.

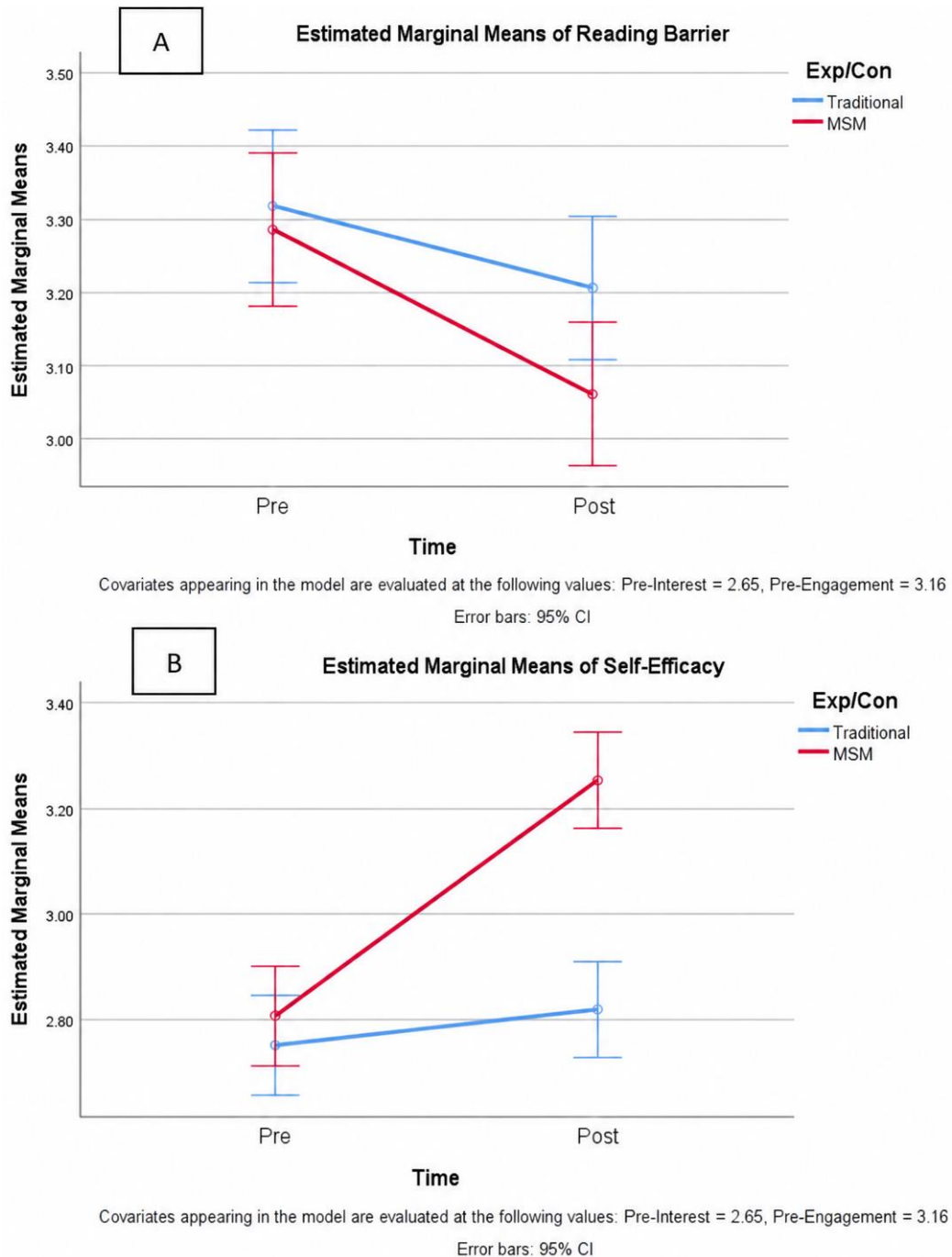


Figure 2. Estimated Marginal Mean Plot for Reading Barrier (A) and Self-Efficacy (B).

As per Table 5 and Figure 2 (A), the Reading Barrier notably reduced from pre-test (3.285 ± 0.053) to post-test (3.062 ± 0.05) in the MSM group, which is significantly higher than the notable reduction in the Traditional group from pre-test (3.317 ± 0.053) to post-test (3.206 ± 0.05). As per Table 5 and Figure 2 (B), Self-Efficacy notably

increased from pre-test (2.807 ± 0.048) to post-test (3.253 ± 0.046) in the MSM group, which is significantly higher than the notable increment in the Traditional group from pre-test (2.752 ± 0.048) to post-test (2.819 ± 0.046).

In terms of the confounding factors, namely Pre-Engagement and Pre-Interest, unique confounding effects of both factors are found on self-efficacy and reading barriers. Two independent outcome measures were used. Reading barriers were measured using a Likert-scale questionnaire (mean scores as continuous variables). Reading comprehension was assessed using the BEC Preliminary Reading Test (total correct responses). These raw scores were analysed directly and were not transformed into the Reading Barrier factor. The two instruments thus measured distinct constructs and were analysed separately for different research questions. As per between-subject effects, there is a significant difference between the MSM and Traditional groups in terms of Reading Barrier ($F = 4.32$, $p < 0.05$) and Self-Efficacy ($F = 14.839$, $p < 0.05$) for the difference in Pre-Interest and Pre-Engagement in English learning. This indicates that higher engagement in English significantly reduces the Reading Barrier and significantly increases Self-Efficacy. However, engagement increases Self-Efficacy more strongly, whereas interest reduces the Reading Barrier more strongly, indicating an increase in English comprehension. As per Table 6, the between-subject effect shows a significant difference in Reading Barrier ($F = 13.782$, $p < 0.05$) and Self-Efficacy ($F = 8.167$, $p < 0.05$) at different levels of Pre-Interest. This indicates that higher interest in English significantly reduces the Reading Barrier and significantly increases Self-Efficacy. The within-subject contrast in Table 6 indicates that the interaction of Time and Pre-Engagement ($F = 4.006$, $p < 0.05$, partial eta-square = 0.021) has a significant effect on self-efficacy. This indicates that higher pre-engagement increases self-efficacy from pre-test to post-test more significantly than lower pre-engagement.

Therefore, the results of the repeated-measures ANCOVA depicted the hypothesis-testing results with the following details, where the directions are evaluated through descriptive statistics and mean differences projected in graphical representation (Table 7).

Table 7. Results from Hypothesis Testing.

Hypothesis	Accepted/Rejected	Details
H1: Can the multimodal scaffolding module improve reading efficiency more compared to the conventional method among EFL learners at a private college in China	Accepted	MSM has a significant and comparatively lower effect on reducing reading barriers or improving reading efficiency than the effect on Self-Efficacy.
H2: Can the multimodal scaffolding module improve self-efficacy higher compared to the conventional method among EFL learners at a private college in China	Accepted	MSM has a significant and comparatively stronger effect on improving self-efficacy than on enhancing reading efficiency (reducing reading barrier).

5. DISCUSSION

5.1. Key Interpretations

The results of the study demonstrate that the multimodal scaffolding module (MSM) had a substantial positive impact on learners' outcomes, particularly in reducing reading barriers and enhancing self-efficacy. The descriptive findings indicated that although both the experimental and control groups showed improvement from pre-test to post-test, the magnitude of change was significantly greater in the MSM group. Specifically, reading barriers decreased more noticeably in the experimental group compared to the traditional group, suggesting that multimodal support effectively facilitated comprehension processes.

Similarly, self-efficacy exhibited a marked increase in the MSM group, with a stronger effect size compared to reading barriers. This implies that multimodal scaffolding not only supports cognitive processing but also positively influences learners' confidence in handling reading tasks. The repeated-measures ANCOVA results further confirmed statistically significant differences between groups over time, particularly for self-efficacy, where the interaction effect

was notably strong. Moreover, the findings highlight the role of learner-related factors in significantly reducing reading barriers and enhancing self-efficacy. The stronger influence of engagement on self-efficacy suggests that active involvement in multimodal learning environments plays a critical role in shaping learners' beliefs and performance. Thus, these results indicate that the MSM intervention is more effective than traditional instruction in promoting both cognitive and affective dimensions of EFL reading development.

5.2. Comparison with Existing Literature

The findings of the current study provide substantial empirical evidence for the efficacy of using multimodal scaffolding to improve EFL reading comprehension for BE. Grabe and Stoller (2019) argued that reading comprehension in EFL contexts is constrained by linguistic and cognitive barriers, which can be minimised through instruction. The substantial reduction in reading barriers for the experimental group is in line with research emphasising the importance of instruction in supporting reading comprehension. Similarly, reading comprehension barriers are often associated with vocabulary limitations and strategy use (Alahmadi & Foltz, 2020). Thus, these strategies can be applied to increase reading comprehension in BE.

The findings of the study also align with previous research by providing substantial evidence that multimodal scaffolding is more effective than traditional instruction. This is supported by the understanding from Sweller (2011) that instruction, especially when it incorporates multiple modes, can reduce cognitive load and improve learning. The findings of the current study show a more substantial impact on self-efficacy. Thus, the instruction can have a twofold impact on both cognitive and affective learning. Moreover, the significant improvement in self-efficacy observed in the experimental group aligns with Social Cognitive Theory (Bandura, 2001). The significant interaction effect observed in this study for self-efficacy between time and group suggests that a multimodal learning environment is more engaging and has a positive impact on learners' self-confidence. It aligns with previous assertions that multimodal learning environments have a positive impact on learners' engagement and motivation (Anis & Khan, 2023). However, it seems that the effect observed in this study is more significant than that in previous studies. Consequently, it may suggest that a combination of scaffolding and multimodality may have a synergistic effect.

Although previous studies projected scaffolding as a teaching tool, this study challenges this conceptualisation by demonstrating that it is possible to use scaffolding in a more interactive and learner-centred learning environment by combining it with a multimodal learning environment. It aligns with the previous evidence that multimodal scaffolding can improve collaborative learning and engagement (Xu, He, Wu, Hwang, & Wu, 2025). However, there is also a concern about the degree to which the results can be attributed to the use of multiple modes as opposed to learner engagement. Therefore, there is a need for further research to evaluate its efficacy in multiple modes.

Additionally, establishing the role of learner-related factors as predictors of learners' reading results is a significant finding in this study. This is similar to evidence that metacognitive and motivational factors are significant in learners' reading comprehension (Soto et al., 2023). However, the more dominant role of learners' engagement in learners' self-efficacy may imply that affective factors play a more central role than previously thought. Despite the contribution of the study, it is important to note that the results of the study may not be generalised over a wide period. Although the experimental approach of the study is effective, the study was conducted over a short period. Furthermore, while the study was effective in demonstrating the use of multimodal scaffolding, it could not fully account for the individual contribution of each mode.

5.3. Practical Implications

The implications of the study's findings could be of particular importance to various stakeholders. First, the significant effects of multimodal scaffolding on learners' reading comprehension and self-efficacy may encourage educators to integrate this type of instruction into their teaching practice. The implications of the study's results may encourage educators to design learner-centred BE curricula that focus on this. It could yield not only cognitive

learning benefits but also affective ones. Second, the significant effects of multimodal scaffolding on learners' self-efficacy may prompt educators to focus more on creating a supportive learning environment. Thereby, learners can develop their self-efficacy, which is a critical aspect of learning, especially language learning. To this end, educators may use various instructional methods, such as the Gradual Release of Responsibility (GRR) model, which is helpful in creating a supportive learning environment where learners can develop their self-efficacy. Third, the significant effects of multimodal scaffolding on learners' reading comprehension and self-efficacy may prompt educators to integrate technology into EFL classrooms. Thereby, learners can benefit greatly from various learning management tools.

5.4. Limitations and Future Scope

Despite the study's positive contributions, there are a few limitations. First, the study's small sample from a single private college may not be representative of other EFL learning situations. Despite its practicality, the use of convenience sampling limits the generalisability of the findings, as the sample may not fully represent the broader population of Business English learners in different institutional or cultural contexts. Therefore, the results should be interpreted with caution, and future studies are encouraged to employ more rigorous sampling techniques. Second, the study's intervention period is short. It may not fully reflect the extended effects of multimodal scaffolding on reading acquisition. Finally, the study only considered quantitative data, which may not fully account for qualitative findings that can provide a more in-depth understanding of learners' experiences. Furthermore, individual learners' differences, such as digital literacy, were not fully investigated. These limitations of the study imply that the findings must be viewed with caution. Therefore, future research may include more participants from different learning situations, as well as a more extended intervention period. It would aid in fully investigating the effects of multimodal scaffolding on reading acquisition. Future research may also use both quantitative and qualitative approaches, as well as individual learners' differences, to gain a better understanding of learners' experiences.

6. CONCLUSION

This study aimed to explore the effectiveness of a multimodal scaffolding module in enhancing the reading comprehension skills of Business English learners in a Chinese EFL setting. The study's results offer compelling evidence that multimodal scaffolding is a more effective instructional method compared to conventional learning methods.

It also enhanced learners' reading performance while overcoming comprehension challenges. One of the main contributions of this study is the dual effect of multimodal scaffolding. While learners' improved reading comprehension is evidence of its effectiveness as a learning tool, learners' high levels of self-efficacy offer strong evidence of its effectiveness in building learners' confidence and motivation. Thus, it emphasised the need to take a learner-centred approach to learning, not only to enhance learners' comprehension of learning materials but also to enhance their level of engagement with learning.

Moreover, this study contributes to the existing body of literature by proving the efficacy of incorporating the principles of scaffolding and multimodal learning within a structured framework. The application of the GRR model in this study ensured that learners were provided with the necessary support while developing independence in learning. This is a significant aspect that has often been neglected in traditional methods of teaching EFL, especially in contexts such as developing nations and nations that still follow a teacher-centred approach. Moreover, this study also proved that various learner-related issues, such as interest and engagement in reading, have a significant impact on reading outcomes. It is evident from this study that developing a learning environment that is both engaging and interactive has a significant impact on reading outcomes and self-efficacy, thereby contributing to more sustainable language development.

This study contributes to the existing body of literature by providing a significant understanding of innovative teaching methods in EFL education, especially in specialised fields such as Business English. This study proves that incorporating multimodal learning and scaffolding is a practical and effective teaching strategy that has the potential to transform reading education by addressing both linguistic and affective issues in language learning.

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Institutional Review Board Statement: The Ethical Committee of the Guangzhou College of Technology and Business, China has granted approval for this study under protocol number [Approval No. GCTB-LH-2025-203], dated [01 February 2025].

Informed Consent Statement: Informed verbal consent was obtained from all participants prior to their participation in the study. All collected data were anonymized to ensure participant confidentiality and privacy.

Transparency: The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.

Competing Interests: The authors declare that they have no competing interests.

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