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Promoting L2 learners' critical thinking skills: the role of social constructivism in reading class

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Introduction: In the rapidly evolving digital landscape, the imperative for success has increasingly spotlighted the essential need for students to develop critical thinking and reading skills as key competencies for the 21st century. This study sought to explore the potential of constructivism to enhance learners' critical thinking and reading abilities, alongside evaluating their receptiveness to this pedagogical approach.

Methods: A mixed-methods research design was employed, combining a quasi-experimental framework with semi-structured interviews. The quasi-experimental component compared the effectiveness of constructivist and traditional teacher-centered methods in promoting critical thinking skills. Semi-structured interviews were conducted to gauge participants' satisfaction with the constructivist approach and to gather qualitative data on their experiences.

Results: The investigation yielded two principal findings. First, the constructivist approach significantly outperformed traditional teacher-centered methods in promoting critical thinking skills among students. Second, the majority of participants reported a high level of satisfaction with the constructivist method, attributing this to the approach's facilitation of deeper knowledge acquisition and increased opportunities for interaction with peers and instructors.

Discussion: Theoretical implications of this study underscore the value of constructivism in fostering an engaging and interactive learning environment conducive to the development of critical analytical skills. Practically, the findings advocate for educational practitioners and institutional leaders to consider the integration of constructivist strategies in reading sessions to bolster students' critical thinking and reading competencies. Moreover, it emphasizes the necessity for educators to receive comprehensive training on the nuances of constructivist pedagogy to ensure its effective implementation. This study thus contributes to the pedagogical discourse by affirming the efficacy of constructivism in enhancing critical cognitive skills and by outlining a pathway for its successful adoption in educational settings.

KEYWORDS

Constructivist approach, reading skills, critical thinking, critical reading, mixed-methods research

1 Introduction

Critical reading and thinking skills are paramount within the realm of higher education, serving as foundational competencies for academic success and active engagement in scholarly discourse (Le et al., 2022). The pedagogical imperative to equip students with these skills is underscored by their role in fostering independent thought and facilitating learners' engagement with and contribution to the knowledge economy, particularly through the lens of their unique experiences. Despite the recognized importance of these competencies, existing literature points to a notable deficiency in critical reading skills among many students in Asian

educational contexts (Le et al., 2022). Research by Khodary and AbdAllah (2014) highlights that learners within the English Diploma program at Arar College of Education and Arts predominantly exhibit a tendency toward generating literal interpretations of texts, demonstrating a significant gap in critical engagement with reading materials. This tendency toward surface-level engagement is corroborated by Zin and Eng (2014), who categorize Asian students broadly as passive in their reading and thinking processes. This lack of engagement is further detailed by Zin et al. (2014), who identify a shortfall in students' analytical and inferential reasoning abilities, indicative of a broader absence of higher-order thinking skills deemed crucial for tertiary education success (Le et al., 2024).

The pedagogical approaches within many Asian educational institutions often do not sufficiently address this gap. There is a documented tendency for students to passively follow lecturers' directives on reading assignments without critical engagement, while instructional focus remains predominantly on language skills enhancement, such as vocabulary development and basic comprehension (Wilson, 2016; Bean and Melzer, 2021). This approach contributes to students' challenges in critically analyzing and evaluating texts, thereby negatively impacting their research competencies and professional development. Furthermore, the existing literature suggests a pervasive lack of initiative among EFL/ESL educators to integrate critical reading instruction effectively within their pedagogy, thus impeding the advancement of students' reading proficiencies (Zhang, 2012).

A promising avenue for addressing these pedagogical challenges is the constructivist approach, which prioritizes the creation of an active learning environment and the promotion of higher-order thinking. While constructivism has been explored across various disciplines (Huffman et al., 2003; Hằng et al., 2015; Nguyen and Le, 2023), its application toward fostering critical thinking and reading skills remains underexplored (Asghar and Al-Bargi, 2014; Hajare et al., 2016). Notably, prior studies often neglect to adhere strictly to constructivist principles, thereby casting doubt on their applicability and efficacy (Baviskar et al., 2009; O'Connor, 2022). Furthermore, there is a discernible gap in empirical research examining the effectiveness of constructivist methodologies in enhancing ESL/EFL learners' critical reading and thinking capabilities (Ali, 2020).

Previous studies in the Vietnamese context have begun to explore the application of constructivist approaches in English language teaching and their impact on critical thinking and reading skills. For instance, Nhat et al. (2018) investigation into the use of Socratic questioning highlights the potential for interactive strategies to foster critical thinking among EFL learners, yet it stops short of assessing the longitudinal effects of such methods on reading comprehension. Similarly, Phung and Yen (2020) study on the flipped classroom model reveals positive outcomes on students' engagement and comprehension but lacks a thorough examination of how these methods specifically enhance critical analytical abilities in reading. Le et al. (2020) provide a valuable overview of critical thinking skills among university students, pinpointing a gap in teaching practices but not directly linking these deficiencies to the effectiveness of constructivist teaching strategies. Allison and Do (2015) discuss project-based learning's opportunities and challenges without delving into the specific impacts on critical reading skills. These studies collectively underscore a critical research gap: a need for more focused investigations into how constructivist approaches, tailored to the Vietnamese educational landscape, can concretely and effectively enhance critical thinking and reading skills among university-level EFL learners, with an emphasis on methodological rigor and comprehensive evaluation of outcomes over time.

This study seeks to bridge these gaps by empirically assessing the impact of a constructivist teaching approach, augmented by technological tools, on the development of critical thinking and reading skills among ESL/EFL learners. It aims to contrast the efficacy of constructivist strategies with traditional teacher-centered methods and gauge learners' perceptions of constructivist-based reading instruction. In doing so, this research endeavors to contribute to the pedagogical literature on constructivism and the cultivation of critical skills, potentially informing innovative instructional practices that shift from passive learning to an engaging, student-centered model. Through this investigation, the study addresses critical research questions concerning the relative effectiveness of constructivist approaches and students' perspectives on constructivist reading lessons, thus offering insights into optimizing reading instruction for enhanced learner engagement and skill development.

1 To what extent is the constructivist approach more or less effective than the conventional method in enhancing critical thinking and reading skills?
2 What are students' perspectives toward reading lessons implemented via the constructivist approach?

2 Literature review

2.1 Constructivism and constructivist learning design

Constructivism is a philosophical framework that elucidates the process by which learners construct knowledge based on their experiences. According to Piaget (1971), constructivism is a theory that describes how individuals modify and build their knowledge. Central to the constructivist philosophy is the belief that knowledge is not simply transmitted but acquired through meaningful experiences and the exchange of perspectives with others (Vygotsky and Cole, 1978). The ability of individuals to reason logically about their experiences undergoes qualitative transformations as they mature. Constructivist learning environments provide opportunities for learners to establish meaningful connections between newly acquired knowledge and their prior experiences. In most constructivist-based pedagogies, the role of the teacher extends beyond observation and assessment to active interaction with students, engaging in activities, posing questions, and fostering reasoning. One effective approach to achieve this is through the use of open-ended questions. The teacher and peers are responsible for creating an environment, posing challenges, and providing support that promotes cognitive constructivism (Shah, 2019).

It is important to note that constructivism is a theory of learning rather than a specific curriculum design. Therefore, while a lesson can be considered constructivist, it does not necessarily adhere to a fixed formula (Richardson, 2003; O'Connor et al., 2018). Instead, a constructivist classroom is organized and implemented in a way that maximizes learning opportunities for students, irrespective of the instructional approaches employed. However, the researchers posit that not all constructivist lesson designs can be deemed equally

effective, and teachers must meet a minimum standard of practice to truly characterize their classes as constructivist. Furthermore, the essential characteristics of constructivist classrooms can be used to evaluate educational institutions. Gagnon and Collay (2001), in their work "Designing for Learning," particularly in the chapter on "Constructivist Learning Design" (CLD), emphasize that the primary goal of education is the development and improvement of students. Teaching should serve as a means to this end and therefore be of secondary importance. The CLD proposed by Gagnon and Collay (2001) offers teachers a constructivist perspective on structuring classroom activities to facilitate student learning. The six fundamental components of CLD, which interweave in the actual classroom learning process, are situation, groupings, bridge, questions, display, and reflection.

The "situation" sets the stage for student engagement by stating the objectives and tasks. "Groupings" refer to the social structures and interactions that connect students throughout the learning activities and episodes. The "bridge" involves connecting students' prior knowledge to new content, allowing them to interpret new information in the context of their existing cognitive maps, beliefs, attitudes, and expectations. "Questions" stimulate student thinking, inspire information sharing, and integrate thoughts and dialog throughout the learning process. This social context enables students to respond to questions posed by the teacher, peers, or guests, focusing on what Gagnon and Collay refer to as "objects of learning." "Reflections" provide opportunities for students and teachers to critically consider and discuss their individual and collective learning experiences. This encourages participants to consolidate their knowledge, apply their learning to other aspects of the curriculum, and look forward to future learning episodes.

While Gagnon and Collay (2001) define CLD with six components, Baviskar et al. (2009) distill the activities, structure, content, or setting of a constructivist lesson into four essential elements: "eliciting prior knowledge," "creating cognitive dissonance," "application of knowledge with feedback," and "reflection on learning." Similarly, if students' prior knowledge is not brought to their attention, the new content may be rejected or poorly integrated. Therefore, eliciting prior knowledge becomes the first essential prerequisite in a constructivist classroom. The second essential component is the creation of cognitive dissonance, where students differentiate between their prior knowledge and new information (Inch, 2002; Sewell, 2002). By challenging existing beliefs and understanding, cognitive dissonance prompts students to reevaluate and reconceptualize their knowledge. The third component, "application of knowledge with feedback," aligns with Windschitl's concept (2002). Students who engage in actively applying and updating their knowledge in light of new information are more likely to comprehend and integrate it effectively. This application not only validates their ideas but also helps students establish connections between new knowledge and a broader range of contexts, thereby fostering long-term integration. The fourth essential condition is reflection on learning. After acquiring and analyzing new knowledge, learners need to be aware of their own learning process. The presence of reflective practices significantly enhances the constructivist nature of the learning experience, even if it is not explicitly included in the lesson plan.

Constructivist learning design should incorporate the elements outlined by both Gagnon and Collay (2001) and Baviskar et al. (2009). Additionally, Gagnon and Collay (2001) emphasize the crucial role of creating a positive and effective classroom climate as an intrinsic component of CLD. This enables educational assessors and instructors to effectively and efficiently employ the constructivist teaching method.

In summary, constructivism provides a theoretical framework for understanding how learners actively construct knowledge from their experiences. It highlights the importance of meaningful and interactive learning environments where students can connect new knowledge with their prior experiences. While there is no prescribed formula for a constructivist lesson, certain essential components, such as eliciting prior knowledge, creating cognitive dissonance, applying knowledge with feedback, and fostering reflection, contribute to an effective constructivist learning experience. By incorporating these elements, teachers can create a rich and engaging learning environment that promotes critical thinking and knowledge construction among students.

2.2 Critical thinking and critical reading skills in higher education

Critical thinking and critical reading are recognized as essential skills for students in the 21st century, particularly in the context of a rapidly evolving digital world (Le et al., 2022, 2024). As the abundance of information becomes increasingly overwhelming, students need the ability to selectively and critically analyze the data they encounter in their academic and professional endeavors. In higher education, it is crucial to equip undergraduates with the skills to actively and critically engage with reading materials, rather than passively consuming information as traditionally done in many classrooms. This shift is necessary to meet the demand for producing competent and successful future professionals who possess not only core academic knowledge but also collaborative, self-directed, flexible, creative, analytical, self-assessment, and decision-making skills (Le et al., 2022). Education have emphasized the importance of active student engagement, personal development, creativity, autonomy, thinking skills, and, most importantly, the enhancement of critical reasoning.

Critical thinking, as defined by Paul and Elder (2019) is a cognitive process that involves thoughtfully assessing, evaluating, and restructuring an individual's perspective on a particular subject, issue, or problem. Halpern (2014) describes critical thinking as the application of cognitive skills or strategies to increase the likelihood of success. The American Philosophical Association, through a Delphi panel of 46 discipline experts, provided a comprehensive definition of critical thinking. They characterized it as a deliberate, self-controlled judgment based on the examination of evidentiary, conceptual, methodological, critical, and contextual factors, encompassing interpretation, analysis, evaluation, and inference (Facione, 1990). Facione (1990) categorized the criteria for critical thinking into six key dimensions: interpretation, analysis, evaluation, inference, explanation, and self-regulation.

The teaching of critical thinking is an effective cognitive activity (Mulnix, 2012), and educators play a significant role in fostering critical thinking skills. Instructors have the responsibility to assist students in developing these skills (Marin and Halpern, 2011) as Ennis (1993) argued that teachers are the most influential factor in cultivating critical thinking abilities. Therefore, the ability of students to learn critical thinking depends on the training provided to teachers or faculty members on this subject. In addition to critical thinking

skills, undergraduate students should also develop proficiency in critical reading to effectively comprehend course materials. Furthermore, critical reading is essential beyond the classroom, as it is crucial for managing professional and personal responsibilities and for being an informed citizen. Critical reading entails deep and engaged attention to the text, utilizing higher-order cognitive abilities such as analysis, synthesis, problem-solving, and metacognition to negotiate meanings with the author and generate new insights from the text.

There is a correlation between critical thinking and critical reading, with critical reading being considered a fundamental aspect of critical thinking and a necessary skill for academic and civic success (Dianti, 2015; Hidayati et al., 2020). According to critical reading precedes critical thinking, as one must thoroughly comprehend a text before accurately evaluating its claims. This implies that engaged reading enables readers to analyze, understand, and assess a particular text, facilitating various interactions such as highlighting key points, note-taking, verifying information, brainstorming, outlining, describing aspects of the text or argument, reflecting on understanding, and voicing objections to presented ideas or evidence.

In light of the importance of critical thinking and critical reading skills, it is essential to approach these skills in a systematic and academic manner. Educators and institutions can implement strategies that promote the development of these skills among students.

2.3 Constructivism and learners' critical thinking skills

The application of constructivism in education has direct effects on student learning. They are active participants in the knowledge creation and dissemination processes. They participate in the teaching-learning process and assume responsibility for their education by imbuing it with personal significance in their respective circumstances. Constructivism facilitates cooperative and collaborative learning opportunities for students (Hussain, 2012; Nguyen and Le, 2023), which enhances learners' higher thinking skills.

Constructivist learning is an educational approach that emphasizes reasoning, critical thinking, information comprehension and application, self-regulation, and mindful reflection. According to Vygotsky's Zone of Proximal Development (ZPD) theory, higher-order cognitive processes originate from social interactions and activities within the social environment (Vygotsky and Cole, 1978). Therefore, social engagement with others in the learning environment is essential for the development of critical thinking skills (Lu and Churchill, 2014; Dekker, 2020).

Existing research on constructivist learning environments and critical thinking has primarily focused on evaluating the effectiveness of specific programs and instructional approaches. These investigations often implicitly incorporate the characteristics and concepts associated with constructivist learning environments, as they are based on constructivist instructional methodologies. Constructivist instructional approaches have been identified as forms of learner-centered learning (Kaymakamoglu, 2018), web-based learning, and discussion and cooperative learning (Yang et al., 2005; Hussain, 2012). However, these studies have suffered from limitations such as small sample sizes and a lack of comparative experimental research. Additionally, many of these studies have not fully adhered to constructivist principles. Therefore, further experimental investigations are needed to establish a solid empirical link between constructivist learning environments and the development of critical thinking skills.

2.4 Conceptual framework of the study

Within the educational discourse, constructivism emerges as a transformative paradigm that foregrounds the learner's active role in constructing knowledge through experiential engagement and social interaction (Aljohani, 2017; Najjemba, 2021). This conceptual framework section draws upon the seminal theories of Piaget (1971) and Vygotsky and Cole (1978), positioning constructivism not merely as a pedagogical strategy but as a comprehensive approach to learning and cognitive development. Central to constructivism is the assertion that learners sculpt their understanding and knowledge of the world through interactions and experiences, thereby emphasizing the dynamic interplay between the individual and their environment in the learning process (McKinley, 2015; Grundmann, 2018).

The Constructivist Learning Design (CLD), as elucidated by Gagnon and Collay (2001), further operationalizes this theoretical stance into practical classroom applications. CLD delineates a pedagogical blueprint comprising six interrelated components: situation, groupings, bridge, questions, display, and reflection that collectively foster an environment conducive to active learning and cognitive growth. These components advocate for a learning atmosphere where students engage with real-world situations, collaborate in diverse group settings, connect new knowledge with prior understandings, and partake in reflective practices that consolidate their learning experiences.

Parallel to the constructivist paradigm is the emphasis on developing critical thinking and reading skills within higher education. The proliferation of digital information necessitates that learners not only access but critically engage with a myriad of content. Critical thinking, defined by scholars such as Paul and Elder (2019) and Halpern (2014), involves the judicious evaluation and analysis of information to form reasoned judgments. It is complemented by critical reading, which entails a deep and active engagement with texts, employing cognitive skills to discern underlying meanings, assess arguments, and synthesize new knowledge. The relationship between critical thinking and reading is symbiotic, with the latter serving as both a component and a conduit for the former. However, despite the recognized importance of these skills, there exists a notable gap in the literature concerning the empirical investigation of constructivist approaches in enhancing critical thinking and reading abilities in ESL/EFL contexts. Previous studies, such as those by Yang et al. (2021), John (2018), Hajare et al. (2016) and Asghar and Al-Bargi (2014), have either focused on theoretical models without empirical validation or have not explicitly articulated the constructivist strategies employed. This lack of empirical research underscores a critical gap in understanding the practical implications of constructivism for fostering critical thinking and reading skills.

This study, therefore, proposes to bridge this gap by empirically assessing the efficacy of a constructivist instructional framework in

enhancing critical thinking and reading competencies among ESL/EFL learners. It aims to explore the alignment of constructivist pedagogical practices with the development of higher-order cognitive skills, situating this inquiry within the broader discourse on learner-centered education and the demands of the 21st-century digital landscape. The theoretical underpinnings of constructivism, coupled with the practical necessity of critical thinking and reading skills, provide a robust conceptual framework for this investigation. This research not only seeks to contribute to the theoretical discourse on constructivism and cognitive skill development but also aims to offer practical insights for educators in ESL/EFL settings, thereby addressing the identified research gap and enhancing pedagogical approaches to critical thinking and reading instruction.

3 Methodology

3.1 Participants

This study engaged a purposively selected cohort of 70 undergraduate students, aged between 18 to 20 years, who were pursuing Business Administration courses at a private university located in Vietnam. Specifically, the participants were enrolled in two Preparatory English courses designed to enhance their listening-speaking and reading-writing competencies. For the purposes of this investigation, the students were evenly distributed into two distinct classes based on their enrollment: one consisting of 34 students (comprising 18 males and 16 females) and the other housing 36 students (with 19 males and 17 females).

The selection of participants employed a purposive sampling technique, aimed at choosing students who were actively engaged in enhancing both their English language foundational skills and critical thinking capabilities through structured coursework. This sampling strategy was chosen to ensure that the participants represented a group particularly poised to benefit from and contribute insights into the constructivist teaching approach under investigation.

The instructional regimen for these courses included dedicated sessions for reading and writing skills development, allocated across 3 days each week (Monday, Wednesday, and Friday), with each session extending over a duration of 3 h. The remaining days of the week (Tuesday, Thursday, and Saturday) were reserved for enhancing listening and speaking skills. To gauge the English proficiency levels of the students at the outset of the study, a placement test developed by Pearson Education was administered, situating the participants at a B1 proficiency level according to the Common European Framework of Reference for Languages (CEFR).

The primary instructional material for the reading-writing course was "University Success, Reading, Advanced" (Eickhoff et al., 2018), a textbook designed to cultivate foundational reading skills alongside critical thinking in a variety of academic disciplines including business, linguistics, and science. The textbook was classified as suitable for learners at the B2 level according to the CEFR, as indicated on its cover page.

Participation in this study was entirely voluntary, with all participants being assured of anonymity and confidentiality concerning their personal information. They were also informed that their participation or decision to withdraw from the study would have no bearing on their academic evaluation. Prior to commencing the research, approval was obtained from the university's board of management to ensure that the study adhered to all relevant ethical guidelines and considerations.

3.2 Research design

The study was conducted following a quasi-experimental design with a pre-test and a post-test (Creswell and Creswell, 2017), the results of which were then explained further via interview data. One class was randomly chosen as the control group (Group 1, $n = 34$), and the other was the experimental group (Group 2, $n = 36$). While Group 1 was trained in a conventional way (teacher-centered model), Group 2 learned reading skills in the constructivist approach (student-centered model).

The reading materials used to measure learners' critical thinking/reading abilities were two Part-3 reading passages from the book "IELTS Academic 17" (2022). IELTS texts (International English Language Testing System) were chosen for the tests due to three primary reasons. First, IELTS is one of the most prestigious standardized tests in the globe, and "IELTS Academic 17" was published by Cambridge University Press, one of the best publishers worldwide. Second, IELTS part-3 reading passages covered question types requiring test-takers to use their critical thinking, such as summaries, authors' purposes, opinions, inferences, and facts-opinions. Third, the answers were in multi-choice forms, which deterred raters from giving biased judgments. Therefore, via the employment of IELTS materials, the validity and reliability of the study were enhanced.

In the pre-test, all participants read a passage of about 750 words extracted from "IELTS Academic 17" (2022) and answered 14 questions in 25 min without discussions or use of extra materials. They took the test and wrote the answers on an answer sheet which was collected after the allotted time. In the post-test, the participants were given a different passage of about 750 words, also from "IELTS Academic 17," and wrote down answers to 14 questions on a sheet in 25 min; no discussions or extra documents were allowed.

The semi-structured interviews were organized after the post-test, with nine random participants in the experimental group. There were five open-ended questions on which follow-up inquiries were based and raised when necessary.

3.3 Description of a typical session

As the main focus of the present study was critical reading, the following descriptions only represented the reading lessons. The two classrooms were equipped with learning tools such as projectors, laptops, whiteboards, microphones, and Internet access.

3.3.1 The teacher-centered model

3.3.1.1 The constructivist approach

The participants in the experimental group learned reading following the constructivist approach or the student-centered model, with similar time length and equipment. The learning process was adapted from the proposed criteria for constructivism by Baviskar et al. (2009), which was also identical to the six critical elements

TABLE 1 Description of a typical reading lesson of the control group.

Step	Teacher's activity	Student's activity
1	*Introduce the lesson*	Listen to the teacher
2	*Teach keywords prior to reading* • Present each keyword's form and phonetic transcript. • Conduct pronunciation. • Show examples or situations or photos and ask students to guess the meanings. • Confirm the answers.	Look at the screen. Repeat after the teacher. Guess meaning. Report to the teacher. Write down the information.
3	*Conduct reading comprehension* • Ask students to read the text and answer the questions in the book. • Ask students to check answers with partners and find out evidence for the answers. • Ask students to explain their answers. • Confirm the answers.	Read the text. Answer the questions. Check answers with partners and find evidence in the text. Report answers and explain. Write down the correct answers.
4	*Manage discussions* • Ask students to look at the "critical thinking" section. • Ask students to work in pairs or in groups and discuss responses. • Report responses to the questions. • Evaluate students' ideas.	Look at the section. Work in pairs/ groups and discuss. Report responses.

suggested by Gagnon and Collay (2001). In this learning model, students were allowed to do research online, and they learned vocabulary implicitly through interacting with the text and discussing it with their partners (Tables 1, 2).

3.4 Procedure

The data collection process was conducted over a period of 8 weeks, corresponding to the duration of the English courses. The 8-week duration was strategically chosen based on prior research indicating that intensive instruction over shorter periods can yield measurable improvements in specific skill sets, including language proficiency and critical thinking (Boot et al., 2011; Son and Simon, 2012). Our study's design, focusing on constructivist approaches to enhance critical thinking and reading skills among undergraduate students, was informed by these insights. The concentrated exposure to constructivist pedagogical strategies was anticipated to catalyze notable advancements in students' abilities, making the 8-week period sufficient for observing preliminary yet significant outcomes. Moreover, the curriculum and instruction were meticulously planned to maximize the impact within the given timeframe. The content and activities were aligned with constructivist principles, emphasizing active learning, critical engagement, and reflection, which are conducive to rapid skill development (Fosnot, 2013). The intensive schedule, with 3 days each week dedicated to reading and writing skills, ensured that students had ample opportunity to engage with the material and practice new strategies. Furthermore, while acknowledging the limitations inherent in an 8-week study, we employed rigorous methodological controls to ensure the reliability of our findings. Pre- and post-tests, along with qualitative feedback from participants, provided a multifaceted evaluation of the instructional approach's effectiveness. This triangulation of data sources strengthens the argument that observable changes in critical thinking and reading skills can be attributed to the constructivist pedagogy employed.

On the first day of the study, all participants completed a pre-test in a written format, providing their responses on provided answer sheets. Subsequently, the control group received instruction following a teacher-centered model, while the experimental group received instruction in reading skills utilizing a constructivist approach. On the final day of the study, all participants completed a post-test in a paper-based format to assess their learning outcomes.

In addition to the tests, a subgroup of nine students was randomly selected to participate in semi-structured interviews. These interviews aimed to gain insights into the participants' experiences and perceptions regarding the experimental learning method. Prior consent was obtained from the interviewees, and all interviews were recorded in audio format. During the interviews, the researchers took comprehensive notes on the participants' responses and observed their body language. A summary of the entire data collection process is presented in Table 3, outlining the sequence of events.

3.5 Data analysis

The quantitative data were manually entered into Microsoft Excel and subsequently analyzed using SPSS version 27 (Statistical Packages for Social Sciences) and *R. prior* to analysis, two Shapiro–Wilk tests were conducted to assess the distribution of scores obtained from the pre-test and post-test assessments. The results indicated that both pre-test scores ($W = 0.914$, $p < 0.001$) and post-test scores ($W = 0.881$, $p < 0.001$) deviated from a normal distribution. Consequently, Wilcoxon signed-rank tests were employed to compare the differences between pre-test and post-test scores within each group, while Mann–Whitney U tests were utilized to examine the disparities in scores between the control and experimental groups.

To further validate the findings obtained from the non-parametric tests and account for individual differences and non-normal distribution of the data, Linear Mixed Models (LMM) were conducted using the lmerTest package in R (Kuznetsova et al., 2017). LMM was

TABLE 2 Description of a reading lesson in the constructivist approach.

Step	Teacher's activity	Student's activity
1	*Introduce the general topic*	Listen to the teacher.
2	*Elicit prior knowledge:* • Show a photo or some keywords related to the target text and ask students to report what they knew about the topic. • Raise two or three questions based on major details of the text and ask students to guess the answers. • Write students' guesses on the board (keywords only).	Look at the screen. Report information. Guess the answers.
3	*Create the cognitive dissonance* • Ask students to read the text to find out the information and examine whether their guesses are correct. • Ask students to check answers with partners and find evidence for their answers. • Ask students to report answers and give explanations. • After a student's report, ask one or two other members to give feedback. • Confirm and write the answers next to students' guesses in Step 2. • Give students teacher's own pre-designed task (based on the text) that include questions related to critical thinking (inferences, authors' views, summary, and facts-opinions) to work on in groups (online search allowed). Go around and manage group work. • Ask one member in each group to come to the front and present explanations to one or two questions. • Ask other groups to give feedback or show their own opinions. Confirm the answers. • Ask students to raise questions, if any, about the text. • Ask other students to show their ideas in response to the questions. Confirm the answers.	Read the text and find answers/ evidence. Check with partners. Give explanations. Give feedback. Work in groups and answer the questions. Present answers. Give feedback. Raise questions. Give responses.
4	*Help students apply new knowledge* • Ask students to work in pairs and discuss how the newly learned knowledge relates to their life or another person's life. • Invite two or three members to come to the front and present. Other students ask questions.	Work in pairs. Discuss. Present and ask questions.
5	*Help students reflect on learned knowledge* • Ask students to compare and contrast their guesses and the answers (on the board). • Ask students to summarize what they have learned in the lesson (contents and keywords).	Compare, contrast. Summarize

TABLE 3 Data collection procedure.

Time	The experimental group	The control group
Day one	Took the paper-based pre-test	
Week 1 to Week 8	Learned reading in the constructivist approach	Trained in the teacher-centered model
Last day	Took the paper-based post-test	
Last day	Joined the interviews (9 random students)	Nothing

chosen due to its ability to handle non-normal data distributions and accommodate individual variations that may be overlooked by other tests (Linck and Cunnings, 2015; Norris, 2015). The scores served as the dependent variable, while the groups (control and experimental) and test time (pre-test and post-test) were considered as fixed effects (independent variables). The participants were treated as a random effect. Thus, the fitted model can be expressed as follows:

$$\text{Scores} \sim \text{Group} + \text{Time} + (1|\text{Participant}).$$

Regarding the analysis of qualitative data obtained from the interviews, the researchers followed the six-step paradigm for qualitative data analysis developed by Creswell and Clark (2017). This involved multiple readings of the transcripts and translations to identify and rectify any errors, such as misspellings, grammatical errors, or misunderstandings. The researchers collaborated in the process of identifying keywords, assigning codes, categorizing them, and integrating them into three overarching themes. To mitigate errors and subjectivity, each step of the analysis was performed collaboratively.

4 Results and discussion

Table 4 revealed that both groups witnessed improvements in the post-test, the average gain in the control group being 0.71 while that in the experimental group being 1.71, about 1.0 higher than the control group. However, whether these differences were significant or not was to be analyzed via the non-parametric tests and the LMM.

TABLE 4 Descriptive statistics for the pre-test and post-test scores.

Group	Pre-test			Post-test		
	Mean	SD	95% CI	Mean	SD	95% CI
Control ($n = 34$)	5.79	1.18	[5.39–6.20]	6.50	0.74	[6.25–6.75]
Experimental ($n = 36$)	5.83	1.18	[5.42–6.23]	7.54	1.17	[7.14–7.95]

TABLE 5 Comparisons of the scores within and between groups.

	Mean difference	Z/ U	*p*
Control group (CG) Post-test – Pre-test	0.71	Z = −3.361	<0.01
The experimental group (EG) Post-test – Pre-test	1.71	Z = −5.343	<0.01
Pre-test: CG – EG	−0.04	U = 610	0.976
Post-test: CG – EG	−1.04	U = 321	<0.001

TABLE 6 Fixed effects from the LMM.

	β	*SE*	*df*	*t*	*p*
Intercept	6.754	0.1803	84.75	37.45	<0.001
Experimental Group	0.534	0.2371	68.0	2.25	0.028
Pre-test	−1.214	0.1202	69.0	−10.10	<0.001

Research question 1: To what extent is the constructivist approach more or less effective than the conventional method in enhancing critical thinking and reading skills?

It was apparent from Table 5 that participants in both groups achieved significantly higher scores in the post-test when compared to the scores in the pre-test (all p values under 0.01). It could be inferred that learners were able to develop their critical thinking skills no matter to which teaching or learning models they were exposed. However, the Mann–Whitney U tests revealed that the experimental group gained far better scores in the post-test ($U = 321$, $p < 0.001$) than those in the control group, although there was no significant difference in the pre-test scores between the two groups ($U = 610$, $p = 0.976$). In other words, learning reading in a constructivist way considerably improved participants' critical thinking skills much more than learning reading in the teacher-centered model.

The results from Table 6 demonstrated that there was a positive significant difference in the scores of the experimental group ($\beta = 0.534$, $SE = 0.2371$, $t = 2.25$, $p = 0.028$). This showed that participants in this group outperformed those in the control group. Besides that, the pre-test scores were significantly lower when compared to those in the post-test scores ($\beta = -1.214$, $SE = -0.1202$, $t = -10.10$, $p < 0.001$).

Therefore, it could be concluded that the constructivist approach was far more effective at improving learners' critical thinking skills than the conventional teaching method. This result could be explained by the nature of constructivism itself. As the constructivist approach is a learning theory, not a teaching theory (Richardson, 2003), this method might be more appealing and suitable for learners. Further, during the lessons, the participants in the experimental group were consistently exposed to critical-thinking environments (researching, discussing, reasoning, questioning, and evaluating), making them put in more endeavors to make sense of reading texts and related concepts in real-life situations (Paul and Elder, 2019).

Research question 2: What are students' perspectives toward reading lectures implemented* via *the constructivist approach?

The analysis of the nine interviews revealed three major themes related to the impact of a constructivist classroom on students' cognitive, dispositional, and social aspects as demonstrated in Figure 1.

4.1 A constructivist classroom helps enhance students' cognitive skills (cognitive aspect)

The interviews indicated that all nine students (100%) who participated in the constructivist reading classroom expressed satisfaction with how the class activities facilitated a deeper understanding of the reading materials and improved their ability to analyze, synthesize, and evaluate texts. They also mentioned being able to distinguish between facts and opinions in the readings. This finding suggests that a constructivist learning environment promotes cognitive skill development among students.

The students' statements provided further insights into their experiences. For example, one participant mentioned engaging in additional self-study by reading books and seeking clarification from peers when faced with unclear concepts. This proactive approach to

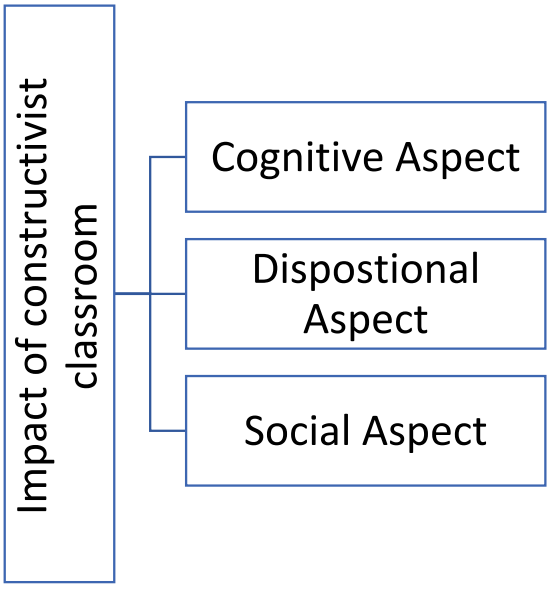

FIGURE 1
Themes from student interviews on constructivist approach.

learning indicates a heightened sense of autonomy and self-directedness, which are essential components of critical thinking (Participant 2).

> "*Honestly, after class, I sometimes study more by reading books, searching for what I can not understand clearly and asking my friends if there are any problems that I can not follow.*" (Participant 2).

Another participant highlighted the value of problem-solving activities in the constructivist classroom, emphasizing the challenge of brainstorming ideas while also recognizing the opportunity to apply both recent knowledge and personal experiences. This student acknowledged that engaging in such activities enhanced their evaluation and analysis skills (Participant 3).

> "*I realize that the problems outside of the lectures are raised to students. As a student, I find it quite challenging to brainstorm ideas, but on the other hand, I think that it would be great because I can apply not only my recent knowledge but personal experiences to them. It somehow advances my evaluation and analyzing skills*" (Participant 3).

Furthermore, students mentioned that class activities helped them retain lecture content and new vocabulary, while also enabling them to ask questions and provide comments based on the reading topics (Participant 4). This observation suggests that the constructivist approach fosters active engagement and promotes the integration of prior knowledge with new information, enhancing comprehension and critical thinking skills.

> "*…those activities helped me to remember the lectures and the new words, and I was able to make questions and give comments based on the reading topics.*" (Participant 4).

One participant noted that answering questions from other groups involved not only grasping the provided content but also utilizing social knowledge to provide satisfactory answers. This observation underscores the importance of social interaction and collaborative learning in developing critical thinking abilities (Participant 9).

> "*…answering questions from other groups is not only about taking the content that is provided, but we also must utilize social knowledge to get satisfying answers. So I believe that class activities required me to think and read more to find the answers.*" (Participant 9).

Overall, the findings indicate that constructivist classroom activities motivate students to think deeply, engage in additional research, and provide well-informed responses to important topics. Students who engage in extensive research and reading are likely to demonstrate improvements in their ability to analyze, synthesize, and evaluate the content they encounter. These experiences contribute to the development of critical thinking skills, enabling students to become critical thinkers and readers (Le et al., 2022).

4.2 A constructivist classroom helps boost students' collaborative skills (social aspect)

The analysis of the interviews also shed light on the social aspect of a constructivist classroom, specifically its impact on students' collaborative skills.

Seven out of the nine students reported being more involved and interactive in the constructivist classroom. They emphasized that many activities in this learning environment required greater team or group participation, providing opportunities for students to learn not only from their instructors but also from their peers. This indicates that the constructivist approach fosters collaborative learning experiences.

Students expressed positive views regarding the increased interaction among classmates and the development of teamwork abilities. They found the new learning approach interesting and beneficial, highlighting the enhanced interaction and collaborative dynamics within the classroom (Participant 3).

> "*From my perspective, I find this new learning approach is quite interesting and beneficial because it is organized as a classroom that boosts the interaction between students, especially the teamwork ability.*" (Participant 3).

One student acknowledged that the constructivist classroom provides a more comprehensive learning experience compared to traditional classrooms, as it involves learning from both teachers and classmates, promoting active engagement rather than passive information reception (Participant 7).

> "*I think the constructivism class helps students learn more than the traditional class. In constructivism class, they not only learn from their teachers but also learn from their classmates and engage in learning experiences rather passively receiving information.*" (Participant 7).

Furthermore, students noted that the constructivist classroom made reading lessons more interesting and facilitated a sense of interactivity among classmates and with the teacher (Participant 9). These findings suggest that the collaborative nature of the constructivist approach encourages student engagement and participation, leading to a more dynamic and enriching learning environment.

> "*The reading lesson becomes more interesting with many interesting activities. I feel more interactive with my friends and my teacher*." (Participant 9).

However, it is worth noting that some students faced challenges when asked to formulate questions for their peers. They expressed difficulties in generating meaningful questions, as most questions had already been asked by their classmates. This observation highlights the need for further support and guidance in developing effective questioning skills within a constructivist setting (Participant 8).

> "*When I am asked about making a question to my classmates, I just do not know what to ask. Most of the questions have been conducted by classmates. I am still forced to have one, which makes me struggle a bit.*" (Participant 8).

Additionally, a few students mentioned that they were initially unfamiliar with the constructivist approach and required time to become accustomed to this new way of learning (Participant 2). This finding suggests that introducing students to the principles and expectations of constructivism at the beginning of the course, as well as providing ongoing guidance and support, can help facilitate a smoother transition and greater engagement with the collaborative aspects of the approach.

> "*It's quite new to me, to be fair, I have not fully exploited the benefits of acquiring knowledge from this new method*." (Participant 2).

These findings indicate that a constructivist classroom promotes collaborative skills by fostering interaction among students and encouraging teamwork. While students generally expressed positive experiences, there were also challenges encountered, such as formulating questions for peers. These insights highlight the importance of supporting students in developing effective collaboration strategies and familiarizing them with the principles of constructivist learning from the outset of their educational journey.

4.3 A constructivist classroom helps students become better critical thinkers (dispositional aspect)

The dispositional aspect of a constructivist classroom, particularly its impact on students' development as critical thinkers, was explored in the interviews conducted with the participants.

Six out of the nine students recognized that engaging in collaborative and interactive activities in the constructivist classroom enhanced their disposition toward critical thinking. They expressed that such activities fostered an open-minded and adaptable approach when addressing questions posed by their instructors and other groups. This finding aligns with previous research by Hussain (2012) and who have highlighted the positive influence of constructivist learning on reasoning, critical thinking, knowledge processing and application, self-regulation, and mindful reflection.

Participants acknowledged that the constructivist classroom encouraged active participation and deeper engagement with the learning materials. Their teachers would often provide questions or tasks to ensure their comprehension and effective application of the lessons. This approach motivated students to investigate further and actively seek appropriate answers (Participant 7).

> "*After having learned the lesson, our teacher usually gave us some questions or some tasks to make sure that we effectively followed the lesson. Therefore, I feel it's somehow worked and helps to investigate more to find proper answers.*" (Participant 7).

Additionally, the constructivist class created opportunities for extensive questioning and answering within their groups, which required students to actively manipulate the material, focus, and be prepared to respond to questions from teachers and peers (Participant 9).

> "*Typically, in the constructivist class I just took, the lecturer created opportunities for our group to ask tons of questions and answer all kinds of questions. So, this requires us to actively manipulate the materials to find the answers, helping me focus and be ready to answer questions from the teachers and friends*" (Participant 9).

The benefits of constructivist classroom activities on students' dispositional development were evident. Students perceived the reading lessons in the constructivist approach as more engaging compared to traditional classes. The incorporation of multiple active learning tasks prompted them to generate ideas, connect prior knowledge to new information, and engage in meaningful communication with their peers and instructors. These experiences, coupled with increased opportunities for research, discussion, and argumentation within groups or teams, contributed to the improvement of their higher-order thinking skills and critical thinking abilities. Consequently, students became more adept at actively interacting and collaborating with their teachers and peers, contrasting with the passive knowledge retrieval commonly observed in traditional classrooms (Marin and Halpern, 2011; Mulnix, 2012).

These findings highlight the positive impact of constructivist learning environments on students' disposition toward critical thinking, emphasizing the importance of active engagement, collaborative problem-solving, and the integration of prior knowledge with new concepts. Such findings align with existing literature and underscore the significance of constructivist approaches in nurturing critical thinking skills among students.

5 Conclusion and implications

The essence of this research lies in its exploration of constructivism's efficacy in nurturing critical thinking and reading skills among EFL learners, alongside assessing student responses to this educational strategy. Utilizing a mixed-methods framework that combines a quasi-experimental design with in-depth interviews, the

study unveiled two pivotal insights. Firstly, it established that a constructivist pedagogical approach significantly outperforms the traditional teacher-centered methodology in cultivating critical thinking capabilities in learners. This discovery underscores the importance of active engagement, collaborative knowledge construction, and the interactive process inherent in constructivism for the development of critical analytical skills. These results resonate with existing literature, reinforcing constructivism's educational value in enhancing critical thinking and reading proficiency.

Secondly, the learners' overwhelmingly positive reception of the constructivist model during interviews emphasizes the method's learner-centric essence. Participants reported a heightened sense of agency in their learning journey, marked by active knowledge construction and substantive interactions with peers and educators. This outcome highlights the empowering potential of constructivist learning, fostering autonomy, collaboration, and deep engagement in the educational process.

In light of these findings, there is a strong recommendation for educators to embrace constructivist methodologies in reading instruction to enrich learners' critical thinking and reading skills. However, a caveat remains: the effective implementation of constructivism necessitates thorough understanding and skilled application. Institutional leaders are advised to seek expertise in this domain to avert superficial applications that may compromise the learning outcomes. Consequently, the development of teacher training initiatives is critical, aimed at equipping educators with the requisite competencies for deploying constructivist pedagogies effectively.

Despite its contributions, this study acknowledges certain limitations. Primarily, it may represent an initial foray into empirical research examining the interplay between constructivism and critical thinking/reading skills, necessitating further investigations to corroborate and expand upon these preliminary insights. Additionally, the difficulty some students faced in crafting questions for peers as per teacher directives suggests a need for future studies to explore supportive strategies. Such research could enable students to formulate open-ended queries, thus enhancing critical thinking and peer-to-peer as well as student-teacher collaboration.

In sum, this research sheds light on the transformative potential of constructivist approaches in fostering critical thinking and reading skills among EFL learners. It advocates for the incorporation of constructivist strategies in reading instruction, coupled with comprehensive educator preparation and further scholarly exploration to substantiate and broaden these initial findings, thereby advancing the quality of EFL teaching and learning.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by the Ethics Committee of FPT University, Ho Chi Minh, Vietnam. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

HVL: Research design, data collection, writing report and proof reading, qualitative analysis. LQN: Research design, data collection, writing report and proof reading, qualitative analysis.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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