



Research Article

Exploring the Influencing Factors of Chinese EFL Learners' Online Interactive Learning

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Abstract

Objective: This study aimed to explore the factors influencing Chinese English as a Foreign Language (EFL) learners' interactive learning in an online learning context. The objectives were to identify these factors, understand their mechanisms, and develop a theoretical model that encompasses these elements.

Methods: The research employed a grounded theory approach to analyze interactive data from the discussion forums of the Course of College English on China university Massive Open Online Courses platform. Data were collected from 3,279 learners during the Fall 2023 semester. The analysis proceeded through open coding, axial coding and selective coding to identify and categorize the influencing factors.

Results: The study identified six main categories: learner characteristics, curriculum structure, teaching competence, expected outcomes, interactive behaviors, and online learning context. These categories were found to be dynamically interconnected, collectively shaping learners' interactive behaviors and overall learning experiences. The core category, "EFL online interactive learning", unified all these elements, highlighting the multifaceted nature of effective EFL online education.

Conclusion: The findings underscore the importance of understanding the interplay between various factors in the EFL online learning environment. The developed theoretical model provides a comprehensive framework for enhancing EFL online education by addressing learner needs, improving curriculum design, and ensuring robust teaching and technological support. These insights offer valuable implications for educators and policymakers aiming to improve online EFL learning outcomes.

Keywords: Chinese EFL learners, online interactive learning, grounded theory, Massive Open Online Courses, theoretical model

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1 INTRODUCTION

With the rapid advancement of technology and the widespread availability of online learning platforms, the landscape of education, particularly in China, has undergone significant transformations. These platforms offer Chinese learners of English as a Foreign Language (EFL) unprecedented opportunities to enhance their language proficiency through interactive activities. However, understanding the factors influencing the interactive learning behaviors of these learners in online settings is crucial for optimizing educational outcomes. This study aims to explore these factors, the mechanisms underlying them, and to develop a theoretical model based on grounded theory methodology.

Interactive behaviors are fundamental to effective language learning, facilitating engagement, deeper understanding, and practical language use^[1]. However, Chinese EFL learners encounter unique challenges influenced by their cultural, educational, and technological contexts. Chinese culture places a strong emphasis on respect for authority and rote memorization, often resulting in a more passive learning style^[2,3]. Additionally, the competitive nature of the Chinese educational system, with its focus on high-stakes testing, complicates the adoption of more interactive and communicative approaches in language learning^[4,5].

Personal factors such as motivation, self-efficacy, and individual learning styles significantly impact interactive behaviors. Motivated learners are more likely to engage actively in interactive activities^[6]. Self-efficacy, or the belief in one's ability to succeed, correlates positively with online engagement^[7,8]. Understanding individual learning styles can enhance engagement by tailoring instructional methods to meet diverse preferences^[9].

Effective instructional design and teacher presence are critical for fostering interactive behaviors. The Community of Inquiry (CoI) framework posits that social presence, cognitive presence, and teaching presence are essential for meaningful interaction^[1]. Instructional designs that incorporate these elements can significantly enhance learner engagement^[10]. Moreover, active teacher involvement and timely feedback are crucial for maintaining student interaction^[11].

Technological factors, including the usability of learning platforms and the availability of interactive tools, also play a vital role in shaping interactive behaviors. The Technology Acceptance Model (TAM) suggests that perceived ease of use and perceived usefulness influence technology adoption^[12]. User-friendly interfaces and effective communication tools have been shown to enhance learner interaction^[13]. Additionally, the integration of multimedia tools and ensuring reliable internet access are essential for

facilitating continuous engagement^[14,15].

Despite extensive research on online learning and interactive behaviors, there is a noticeable gap in understanding how these factors specifically affect Chinese EFL learners. Existing studies often overlook the nuanced interplay of personal, instructional, and technological factors in this unique context^[16]. Furthermore, while the CoI framework and the TAM provide valuable insights, they do not fully capture the specific dynamics at play for Chinese EFL learners^[10-13].

This study seeks to fill this gap by systematically investigating the factors influencing the interactive behaviors of Chinese EFL learners in the online learning context. The data for this study were sourced from the discussion forums in the College English course on China university Massive Open Online Courses (MOOC) platform, providing rich, contextualized insights into learner behaviors. This study employed grounded theory methodology, a qualitative research approach well-suited for developing new theoretical insights from empirical data^[17]. Grounded theory involves systematic data collection and analysis to generate a theory grounded in observed data. The research involved in-depth analysis of interactive data from the discussion forums in the College English course on China university MOOC platform.

By exploring the specific factors and mechanisms that influence interactive behaviors, this study aims to contribute to the body of knowledge on online language learning and provide practical recommendations for educators and policymakers. Enhancing the understanding of these factors can lead to more effective instructional designs and technological solutions tailored to the needs of Chinese EFL learners, ultimately improving their learning experiences and outcomes.

2 LITERATURE REVIEW

2.1 Theories and Models of Online Learning

The study of online learning has become increasingly significant as digital platforms are more widely adopted in education. Understanding the theories and models that underpin online learning is crucial for analyzing the interactive behaviors of learners.

Interaction is a central component of online learning. Moore's seminal work^[18] on interaction in distance education identifies three types of interactions: learner-content, learner-instructor, and learner-learner. These interactions are crucial for effective learning experiences and have been extensively studied in the context of online education^[19].

Constructivist learning theory, which emphasizes the active role of learners in constructing their own

understanding, is foundational to many online learning models. Jonassen^[20] argues that online environments should provide opportunities for learners to engage in authentic tasks and meaningful interactions. This perspective is supported by recent studies that highlight the effectiveness of collaborative and interactive online learning environments^[21,22].

The CoI framework^[1] is another influential model. This framework has been widely validated and applied in various online learning contexts^[23,24]. Recent studies have expanded on the CoI framework, exploring how these elements interact to facilitate deep and meaningful learning^[10,25]. Additionally, the TAM framework^[12] has been extensively used to study online learning adoption and user interaction with digital learning tools^[26,27]. Recent studies^[28,29] have integrated TAM with other models to better understand factors influencing online learning engagement.

Furthermore, connectivism, proposed by Siemens^[30] and Downes^[31], reflects the influence of digital networks on learning. It suggests that knowledge is distributed across a network of connections, and learning consists of the ability to construct and traverse those networks. Recent empirical research has explored how connectivist principles can be applied in online learning environments to enhance learner engagement and interaction^[32,33].

Understanding these theories and models is essential for exploring the interactive behaviors of Chinese EFL learners in online learning contexts. By critically examining these frameworks, researchers can better analyze how various factors influence online learning interactions and outcomes.

2.2 Challenges and Needs of EFL Learners in the Online Environment

In the realm of online learning, EFL learners encounter a unique set of challenges that are distinct from those faced in traditional classroom settings. The absence of face-to-face interaction, which is often a cornerstone for language practice, poses a significant hurdle for these learners^[34]. To address this, it is imperative to explore and incorporate online learning elements that can effectively bridge this gap. For instance, the use of synchronous communication tools such as video conferencing can simulate real-time dialogues, offering learners the opportunity to practice pronunciation, intonation, and immediate language response^[35]. Additionally, asynchronous discussion forums can provide a platform for learners to engage in thoughtful exchanges, allowing for reflection and the development of written communication skills^[36].

Moreover, the integration of multimedia resources, such as interactive videos, podcasts, and online language labs, can cater to different learning styles and preferences, enhancing the overall language acquisition process^[37]. These

resources can provide learners with the necessary exposure to authentic language use, which is crucial for developing both linguistic competence and cultural understanding^[38].

Another critical aspect to consider is the role of peer interaction in an online setting. Collaborative projects and group activities can foster a sense of community and support among learners, which is vital for motivation and engagement^[39]. The design of these activities should encourage active participation and interaction, ensuring that learners are not merely passive recipients of information but active contributors to their learning process^[40].

In summary, while the online environment presents challenges for EFL learners, it also offers innovative solutions to overcome the limitations of physical distance. By thoughtfully integrating a variety of online learning elements, educators can create an enriched learning experience that facilitates language practice and enhances the overall educational journey for EFL learners.

2.3 Specific Context of Chinese EFL Learners

Understanding the specific context of Chinese EFL learners is essential for exploring their interactive behaviors in online learning environments. This study mainly examines cultural, educational, and social factors that shape the learning experiences of Chinese EFL students, based on recent research.

Chinese culture, deeply influenced by Confucianism, places a strong emphasis on respect for authority, rote memorization, and high-stakes examinations^[2]. This cultural background can significantly impact learning behaviors, including a preference for teacher-centered instruction and a reluctance to participate actively in class discussions^[3]. Recent studies highlight that these cultural characteristics can also influence online learning behaviors, where Chinese learners may exhibit less interactive participation compared to their Western counterparts^[16].

The Chinese educational system is characterized by a highly competitive environment, with a strong focus on standardized testing and academic achievement^[4]. This system often prioritizes grammar and vocabulary over communicative competence, which can affect learners' confidence and willingness to engage in interactive language use^[5]. Online learning platforms must therefore address these challenges by creating more supportive and engaging environments that encourage communication and interaction^[41].

Motivation plays a critical role in language learning, and Chinese EFL learners often exhibit a mix of instrumental and integrative motivations. Instrumental motivation, driven by the desire to achieve practical goals such as passing exams or improving career prospects, is prevalent

among Chinese learners^[42]. Integrative motivation, the desire to integrate into the target language community, is less common but has been increasing with globalization and exposure to Western cultures^[43]. Understanding these motivational factors is crucial for designing online learning activities that can sustain learner engagement^[6].

Technological proficiency and access to reliable internet connections are critical factors influencing the effectiveness of online learning. In China, there is a significant digital divide between urban and rural areas, with rural students often facing challenges in accessing high-quality online resources^[44]. Recent initiatives have aimed to bridge this gap, but disparities remain^[45]. Enhancing digital literacy and ensuring equitable access to technology are essential for maximizing the benefits of online learning for all students.

Chinese EFL teachers traditionally play authoritative roles and may lack training in interactive and student-centered pedagogies^[46]. This can affect the implementation of effective online learning strategies. Professional development programs that focus on interactive teaching methods and the use of digital tools are necessary to help teachers adapt to online environments^[47]. Teachers' attitudes towards technology and their willingness to integrate it into their teaching practices are also critical factors influencing the success of online learning initiatives^[48,49].

The specific context of Chinese EFL learners, shaped by cultural, educational, and technological factors, presents unique challenges and opportunities for online learning. Understanding these factors is essential for designing effective online learning environments that foster interactive behaviors and enhance language learning outcomes.

2.4 Interactive Learning and Influencing Factors

Interactive learning in online environments is crucial for effective language acquisition, especially for Chinese EFL learners. Understanding the factors that influence these interactive behaviors can help educators design more effective online learning experiences.

Research underscores the significant impact of personal factors such as motivation, self-efficacy, and learning styles on interactive behaviors in online learning. Motivated learners, as emphasized by Dörnyei and Ushioda^[6], are more likely to engage actively in interactive activities. This active engagement is further supported by high levels of self-efficacy, the belief in one's ability to succeed, which has been shown to correlate positively with online engagement^[7,8]. In addition to these factors, Felder and Brent^[9] highlight the importance of understanding individual learning styles, suggesting that tailoring instructional methods to meet diverse preferences can enhance engagement.

Building on these personal factors, the role of

instructional design and teacher presence becomes critical^[1]. Effective instructional design that incorporates elements responsive to personal factors can significantly enhance learner engagement^[10]. Furthermore, active teacher involvement and timely feedback have been shown to be crucial for maintaining student interaction and engagement^[11].

Technological factors, including the usability of learning platforms and the availability of interactive tools, play a crucial role in shaping interactive behaviors. User-friendly interfaces and effective communication tools have been shown to enhance learner interaction^[13]. Moreover, the integration of multimedia tools and ensuring reliable internet access are essential for facilitating continuous engagement^[14,15].

Despite the extensive research on these factors, there remains a need to understand the specific context of Chinese EFL learners' interactive behaviors in online learning environments. This study aims to fill this gap by exploring the factors affecting these behaviors, the mechanisms through which these factors operate, and the theoretical model constituted by these factors. The study seeks to answer the following three questions: What are the factors affecting Chinese EFL learners' online interactive learning? What are the mechanisms through which these factors operate? What is the theoretical model constituted by these factors?

By addressing these research questions through grounded theory analysis of interactive data from MOOC discussion forums, this study aims to provide a comprehensive understanding of the interactive behaviors of Chinese EFL learners in online learning environments. This research will contribute to the development of more effective instructional designs and technological solutions tailored to the needs of Chinese EFL learners, ultimately enhancing their online learning experiences.

3 METHODOLOGY

3.1 Context

The context of this study involves Chinese university EFL learners who enhance their EFL proficiency by autonomously studying College English courses on the MOOC platform. The College English course offered by the University of Science and Technology Beijing was launched on the China University MOOC platform in 2018 and is one of the most popular courses on the platform. This course is offered twice a year, in the spring and autumn semesters, each lasting 16 weeks. Since its launch, a total of 38,988 university EFL learners have registered for the course by the end of 2023.

The course is designed specifically for first- and second-year university students whose English proficiency is

generally at an intermediate or lower-intermediate level. It comprises five thematic units, each centered around a specific topic, accompanied by two reading articles. The course resources include micro-lecture videos, vocabulary exercises, reading and writing exercises, and topic discussions. The micro-lecture videos cover various learning content, including text analysis, explanations, vocabulary expansion, complex sentence analysis, and cultural comparisons.

Upon registering on the platform, learners can access the course for free during the course availability period. They can independently watch course videos, complete exercises, and engage in discussions with teachers and other learners in the discussion forums.

3.2 Participants

In the fall semester of 2023, a total of 3,279 students registered for the College English course, including 2,136 (65.1%) female students and 1,143 (34.9%) male students, aged between 18 and 22, with the age group distribution as follows: 18-year-olds representing 15.1%, 19-year-olds 20.7%, 20-year-olds 31.7%, 21-year-olds 23.9%, and 22-year-olds comprising the remaining 8.6% of the total student population. This study focuses on these students as the research subjects.

3.3 Instruments

The primary instruments for this study included web scraping tools implemented through Python libraries such as Scrapy, which systematically extracted interaction data from the discussion forums of the College English course on China university MOOC platform. A structured Structured Query Language (SQL) database was utilized to store and organize the extracted data. NVivo, a qualitative data analysis software, was employed for coding and thematic analysis of the data. In summary, this study utilized web scraping tools, a structured SQL database, and NVivo software to systematically extract, store, and analyze interaction data from the College English course discussion forums on the China University MOOC platform.

3.4 Procedures

The study began with the identification (ID) of relevant data sources, targeting the discussion forums of the College English course on China university MOOC platform. The data extraction process involved using web scraping tools to systematically collect posts and replies, including details such as timestamps, user IDs, post content, and interaction threads. Extracted data were stored in a structured format within a SQL database, ensuring organization and accessibility for analysis. In summary, these procedures ensured the systematic collection, organization, and accessibility of comprehensive interaction data for analysis.

3.5 Data Collection

To gather the necessary data for this study, we focused

on the discussion forums of the College English course on the China University MOOC platform. Utilizing Python libraries such as Scrapy, we developed and implemented web scraping tools to systematically extract interaction data. This included posts and replies from both teachers and learners, along with associated metadata such as timestamps, user IDs, post content, and interaction threads.

After extraction, the data was meticulously organized and stored in a structured SQL database. This approach not only ensured the integrity and accessibility of the data but also facilitated efficient management and preparation for subsequent analysis. This comprehensive data collection strategy provided a robust foundation for in-depth examination of learner interactions and behaviors within the MOOC environment.

3.6 Data Processing

Data processing involved several critical steps. First, the collected data underwent a cleaning process to remove duplicates, irrelevant posts, and incomplete entries, followed by anonymization to ensure the privacy and confidentiality of the participants. This filtering resulted in the ID of 18 teacher posts, 142 learner posts, 436 teacher replies, and 8,611 learner replies, totaling 9,207 valid posts and replies.

Next, following the principles of grounded theory methodology outlined by Glaser and Strauss^[17], the data underwent a meticulous qualitative coding process using NVivo software. This process involved three levels of coding: open coding, axial coding, and selective coding. During the open coding stage, the data were systematically analyzed to identify and generate initial codes, capturing discrete concepts and themes present in the text. Subsequently, axial coding was employed to organize these initial codes into coherent categories, elucidating the relationships and patterns between different concepts. Finally, selective coding refined and integrated the core categories, facilitating the construction of a comprehensive theoretical framework. By adhering to the principles of grounded theory and utilizing NVivo software, this coding process enabled a thorough exploration and interpretation of the data, ultimately contributing to the development of theoretical insights into a deeper understanding of the factors influencing EFL learners' interactive behaviors in the MOOC environment.

4 RESULTS

4.1 Open Coding

In the open coding stage, a variety of labels were identified from the data. These labels included terms such as “approachable”, “interesting”, “perseverance”, “effective”, and “teaching approval”, among others. To ensure the relevance and significance of the coding, only labels that appeared three times or more were retained. This process resulted in the ID of 62 initial concepts and 31

Table 1. Examples of Initial Concepts and Categories

Initial Categories	Initial Concepts	Initial Categories	Initial Concepts
A1 Educational level	a1 sophomore, a2 junior	A17 Teaching method	a33 flexible method, a34 good method
A2 Online learning experience	a3 NetEase platform, a4 MOOC Platform	A18 Instructional mode	a35 innovative instruction, a36 impressive instruction
A3 Information technology literacy	a5 speed learning, a6 extract courseware	A19 Classroom organization	a37 scientific, a38 effective
A4 Skill upgrading	a7 improv English, a8 improve oral English	A20 Classroom experience	a39 good impression, a40 good experience
A5 Course preparation	a9 for final exam, a10 for College English Test band 4	A21 Course recognition	a41 teaching approval, a42 course approval
A6 Future planning	a11 for postgraduate exam, a12 get a certificate	A22 Course gain	a43 learned a lot, a44 beneficial
A7 self-regulation	a13 have confidence, a14 easy to follow	A23 Interaction between Ts & Ss	a45 apply for certificate, a46 upload ppt
A8 self-monitoring	a15 keep learning, a16 perseverance	A24 Opinion & feedback	a47 expand the depth, a48 difficult content
A9 Teaching content	a17 rich content, a18 well organized	A25 Interaction between Ss & Ss	a49 greetings, a50 peer help
A10 Learning resources	a19 types, a20 rich resources	A26 Knowledge sharing	a51 method sharing, a52 notes sharing
A11 Course arrangement	a21 good arrangement, a22 reasonable design	A27 Emotional communication	a53 envy, a54 excited
A12 Course assessment	a23 diverse assessment, a24 quiz	A28 Gratitude for the teacher	a55 thanks for the teacher, a56 teacher's hard work
A13 Affinity	a25 approachable, a26 no poseur	A29 Gratitude for the peers	a57 thanks for sharing information, a58 thanks for sharing method
A14 Interestingness	a27 interesting, a28 storyteller	A30 Internet environment	a59 network laggy, a60 internet problem
A15 Sense of humor	a29 humorous, a30 witty	A31 Physical environment	a61 a seat, a62 a quiet place
A16 Instructional language	a31 accuracy, a3 fluency		

initial categories, as shown in Table 1. The identified initial concepts and categories laid the groundwork for further coding and the development of a theoretical model.

4.2 Axial Coding

In the axial coding stage, a comparative analysis of the conceptual and logical relationships among the initial categories was conducted. This analysis led to the ID of 6 main categories and 12 subcategories. The 6 main categories include “learner characteristics”, “curriculum structure”, “Teaching competence”, among others. The 12 subcategories include “educational experience”, “motivation”, “self-efficacy”, etc., as shown in Table 2.

4.3 Selective Coding

In the selective coding stage, through iterative examination, comparison, and analysis of the source materials, this study identified the core category of “EFL online interactive learning”. This core category serves to unify all main categories of factors influencing Chinese EFL learners’ interactive behaviors within the online learning context. The theoretical model diagram depicting these relationships is presented in Figure 1.

The theoretical model represents the interconnected

factors influencing EFL online interactive learning. At its center is “EFL online interactive learning”, which encapsulates the process of engaging with English language learning materials, instructors, and peers in an online environment. Surrounding this central category are the influencing factors, including “expected outcomes”, “learner characteristics”, “curriculum structure”, “interactive behaviors”, “teaching competence”, and “online learning context”. Together, these factors contribute to the overall quality and effectiveness of the EFL online interactive learning experience.

4.4 Theory Saturation Test

In this study, when encoding four-fifths of the data (7,366 cases), no new concepts or categories emerged. Subsequently, the remaining one-fifth of the data (1,841 cases) was analyzed for theoretical saturation. However, this analysis also failed to yield any new concepts, or categories. Consequently, it can be inferred that the grounded analysis of the data collected in this study reached theoretical saturation.

5 DISCUSSION

5.1 Components of the Theoretical Model

The theoretical model developed in this study is designed to encapsulate the multifaceted nature of online EFL

Table 2. Main Categories and Subcategories

Main Categories	Subcategories	Initial Categories
C1 Learner characteristics	B1 Educational experience	A1 Educational level
		A2 Online learning experience
		A3 Information technology literacy
		A4 Skill upgrading
	B2 Motivation	A5 Course preparation
		A6 Future planning
		A7 Self-regulation
		A8 self-monitoring
C2 Curriculum structure	B3 Self-efficacy	A9 Teaching content
		A10 Learning resources
	B4 Course content	A11 Course arrangement
		A12 Course assessment
C3 Teaching competence	B5 Course design	A13 affinity
		A14 interestingness
		A15 Sense of humor
		A16 Instructional language
	B6 Teaching style	A17 Teaching method
		A18 Instructional mode
		A19 Classroom organization
		A20 Classroom experience
C4 Expected outcomes	B7 Teaching ability	A21 Course recognition
		A22 Course gain
		A23 Interaction between Ts &Ss
		A24 Opinion & feedback
	B8 Teaching effect	A25 Interaction between Ss &Ss
		A26 Knowledge sharing
		A27 Emotional communication
		A28 Gratitude for the teachers
C5 Interactive behaviors	B9 Learning effect	A29 Gratitude for the peers
		A30 Internet environment
		A31 Physical environment
	B10 Cognitive interaction between Ts &Ss	
C6 Online learning context	B11 Emotional interaction between Ts &Ss	
	B12 Environmental situation	

learning. Each component of the model is reflective of the various dimensions that contribute to the effectiveness of online language learning experiences.

Expected Outcomes represent the aspirations for language proficiency and academic achievement that learners seek through interactive online EFL education. These outcomes are intrinsically linked to the challenges posed by the absence of face-to-face interaction, where the goals include not only linguistic competence but also the ability to communicate effectively in a virtual environment.

Learner Characteristics encompass personal factors such as motivation, self-efficacy, and learning styles, which are critical in addressing the unique challenges of online learning. These characteristics influence how learners adapt to and engage with online materials and activities, especially

in the context of the cultural and educational background of Chinese EFL learners.

Curriculum Structure pertains to the strategic design and sequencing of EFL course materials that can accommodate diverse learning preferences. This includes the integration of multimedia resources and interactive tools that were identified in section 2.2 as essential in compensating for the lack of physical interaction and enhancing language acquisition.

Interactive Behaviors describe the active participation and collaborative engagement of learners in online discussions and group activities. These behaviors are indicative of the community support and motivation that are vital in an online setting, as highlighted in section 2.2, and are essential for learner success and satisfaction.

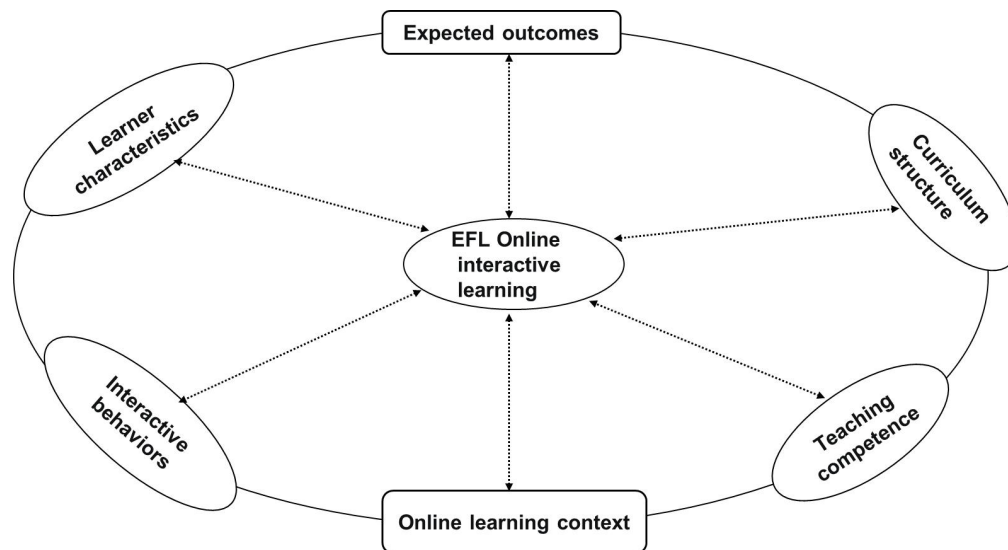


Figure 1. The theoretical model diagram.

Teaching Competence reflects the instructors' ability to navigate the online environment effectively, providing the necessary guidance and feedback to support learners. This component is crucial in fostering an interactive and engaging learning atmosphere that can counteract the challenges of remote learning.

Online Learning Context involves the technological platform and infrastructure that facilitate EFL online learning. This includes the usability of learning platforms, internet connectivity, and the support services that are essential in creating an inclusive and accessible online learning space for Chinese EFL learners.

In summary, the components of the theoretical model are interrelated and mutually reinforcing. They provide a comprehensive framework for understanding the dynamics of online EFL learning and offer a roadmap for educators and policymakers to enhance the learning experience and outcomes for Chinese EFL learners. The model takes into account the unique challenges and needs identified in section 2.2 and offers a structured approach to optimizing the online learning environment.

5.2 Relationships Among These Components

The relationships among the components of the theoretical model are as follows.

Expected outcomes and learner characteristics: Learner characteristics, such as educational experience, learning motivation, and self-efficacy, directly influence the expected outcomes learners aim to achieve through EFL online interactive learning. Learners with higher levels of motivation and self-efficacy are more likely to set ambitious goals and strive for academic success.

Expected outcomes and curriculum structure: The alignment of curriculum structure with expected outcomes

is crucial for guiding learners towards their goals. A well-designed curriculum that clearly articulates learning objectives and provides relevant and engaging materials and activities enhances learners' chances of achieving their desired outcomes.

Expected outcomes and interactive behaviors: Learners' engagement in interactive behavior is driven by their desired outcomes. When learners are motivated to achieve specific goals, they are more likely to actively participate in online discussions, collaborate with peers, and seek out opportunities for learning and skill development.

Learner characteristics and curriculum structure: Learner characteristics influence how learners interact with and navigate the curriculum structure. For example, learners with prior educational experience may approach the curriculum differently than those who are new to online learning. Similarly, learners with high levels of self-efficacy may be more adept at self-directed learning within the provided curriculum structure.

Learner characteristics and teaching competence: The interaction between learner characteristics and teaching competence shapes the effectiveness of instruction. Instructors who are knowledgeable about their learners' characteristics can tailor their teaching strategies to meet individual needs, fostering a supportive and engaging learning environment.

Curriculum structure and interactive behaviors: The design and organization of the curriculum structure impact learners' interactive behaviors. Engaging and interactive learning materials and activities encourage learners to actively participate and collaborate with peers, fostering a sense of community and shared learning experiences.

Teaching competence and online learning context: The

quality of teaching competence is influenced by the online learning context. Instructors' ability to effectively deliver content and provide support to learners may be enhanced or hindered by factors such as technological infrastructure, institutional support services, and internet connectivity.

Online learning context and interactive behaviors: The online learning context sets the stage for interactive behaviors. Factors such as the accessibility of learning platforms, ease of navigation, and availability of support resources can either facilitate or impede learners' engagement and participation in online activities.

5.3 Theoretical Propositions

Based on the theoretical model and the relationships among its components, the following theoretical propositions can be derived.

Firstly, learner characteristics influence interactive behaviors and learning outcomes. Individual factors such as educational experience, motivation, and self-efficacy are critical in determining how learners engage with online materials and interact within the learning environment. Learners who exhibit higher levels of motivation and self-efficacy are more likely to engage in proactive interactive behaviors and achieve better learning outcomes.

Secondly, the curriculum structure directly affects learner engagement and interactive behaviors. The design and organization of the curriculum, including the sequencing of lessons and the types of learning activities provided, significantly impact learners' engagement levels. A well-structured curriculum that incorporates interactive and engaging activities encourages active participation and collaboration among learners.

Thirdly, teaching competence enhances the effectiveness of online learning. The skills, knowledge, and qualifications of instructors are vital for delivering effective online instruction and providing necessary support to learners. High teaching competence facilitates better content delivery, clearer explanations, and more responsive feedback, thereby enhancing the overall learning experience.

Fourthly, expected outcomes drive motivation and interactive behaviors. The goals and objectives that learners aim to achieve through EFL online interactive learning, such as improved language proficiency and academic success, significantly drive their motivation and engagement. Learners who have clear expectations and goals are more likely to participate actively in discussions and other interactive activities.

Fifthly, the online learning context influences the quality of interactive behaviors. The technological infrastructure and overall environment supporting EFL online learning,

including platform accessibility, internet connectivity, and institutional support services, play a foundational role in determining the quality and frequency of learners' interactive behaviors. A conducive online learning context enhances learners' ability to engage effectively in online interactions.

Lastly, the interaction among components determines overall learning success. The interplay between learner characteristics, curriculum structure, teaching competence, expected outcomes, and the online learning context collectively determines the overall success of the online learning experience. Effective integration and alignment of these components lead to more positive learning outcomes and higher levels of learner satisfaction.

These theoretical propositions provide a comprehensive framework for understanding the various factors influencing Chinese EFL learners' interactive behaviors in online learning environments. They also offer a basis for future research and practical interventions aimed at enhancing the effectiveness of EFL online education.

6 CONCLUSION

6.1 Major Findings

This study aimed to explore the factors influencing Chinese EFL learners' interactive behaviors in an online learning context. Through grounded theory analysis, several major findings emerged. The study identified six main categories: learner characteristics, curriculum structure, teaching competence, expected outcomes, interactive behaviors, and online learning context. These components were found to be dynamically interconnected, collectively shaping the learners' interactive behaviors and overall learning experience. The core category, "EFL online interactive learning", was found to unify all these categories, highlighting the multifaceted nature of effective EFL online education.

When compared to existing interactive learning theories, such as CoI framework, which emphasizes cognitive presence, social presence, and teaching presence^[1], this study's findings reveal both overlaps and distinctions. Similar to CoI, our study underscores the importance of teaching competence and learner engagement. However, it extends the framework by emphasizing the specific contextual factors of online learning in a Chinese EFL context, such as unique learner characteristics and curriculum structure. This comparison illustrates the added complexity and specificity of EFL online interactive learning, demonstrating how cultural and contextual factors can shape educational dynamics differently from more generalized models.

By situating these findings within the broader discourse of interactive learning theories, this study contributes to a

more nuanced understanding of the unique challenges and opportunities in EFL online education. It also underscores the need for tailored educational strategies that consider the specific needs and contexts of learners.

6.2 Implications

The findings of this study have significant implications for both educators and policymakers, offering actionable insights that can enhance the quality and effectiveness of EFL online education.

For educators, understanding the interplay between learner characteristics and curriculum structure is crucial. This knowledge allows educators to design courses that are more effective and engaging for EFL students. By tailoring course content to meet diverse learner needs, educators can incorporate a variety of learning activities that cater to different learning styles and levels of motivation, keeping students engaged. Additionally, a well-structured curriculum that progresses logically and includes interactive components, such as discussions and collaborative projects, can stimulate active participation and deeper learning. Providing clear, detailed syllabi and structured learning paths helps students navigate the course more effectively. Enhancing teaching competence is another vital area. Continuous professional development for instructors, focusing on online teaching strategies, technological tools, and student engagement techniques, can significantly improve instructional quality. Encouraging instructors to adopt a student-centered approach, where they actively engage with students through timely feedback and personalized support, enhances the learning experience. Peer mentoring and collaborative teaching practices also contribute to improved teaching outcomes. Furthermore, setting clear expected outcomes is also important. Clearly defined learning outcomes help align instructional strategies with student goals, and communicating these outcomes transparently can increase student motivation and focus. Regularly assessing and revising these outcomes based on student feedback and performance data ensures they remain relevant and attainable. Implementing formative assessments and providing progress tracking tools helps students stay informed about their progress toward these goals.

For policymakers, investing in robust technological infrastructure is essential. Ensuring high-speed internet access, reliable online learning platforms, and user-friendly interfaces facilitates seamless navigation and interaction for learners. Providing resources for regular maintenance and updates of technological tools ensures that learning platforms remain functional and up-to-date, which is crucial for sustaining effective online learning environments. Additionally, establishing comprehensive support services, such as technical support, academic advising, and mental health resources, helps students overcome challenges they may face in the online learning environment. These services

should be easily accessible and responsive to students' needs. Policies promoting flexibility in learning, such as asynchronous learning options and varied assessment methods, accommodate different learner circumstances and enhance their ability to succeed.

By addressing these areas, educators and policymakers can create a more supportive and effective EFL online learning environment, ultimately leading to improved learner engagement and better educational outcomes.

6.3 Limitations and Suggestions for Future Research

Despite its contributions, this study has several limitations. First, the data was collected from a single MOOC platform in China, which may limit the generalizability of the findings to other contexts or platforms. Second, the study relied on discussion forum data, which might be subject to biases such as social desirability or inaccurate recall. Third, the study focused on EFL learners in a specific educational setting, which might not capture the experiences of learners in other subject areas or learning environments. Finally, the grounded theory approach, while thorough, may not account for all possible factors influencing EFL online interactive learning.

Future research should consider expanding the scope of study to include multiple MOOC platforms and diverse educational contexts to enhance the generalizability of the findings. Longitudinal studies could provide deeper insights into how interactive behaviors and learning outcomes evolve over time. Additionally, incorporating quantitative measures alongside qualitative analysis could offer a more comprehensive understanding of the factors influencing EFL online interactive learning. Investigating the role of emerging technologies, such as AI and adaptive learning systems, could also provide valuable insights into how to further enhance the EFL online learning experience.

In conclusion, this study provides a nuanced understanding of the factors influencing Chinese EFL learners' interactive behaviors in an online learning context. By identifying key components and their interrelationships, it offers a theoretical framework that can guide future research and practical interventions aimed at improving EFL online education.

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Conflicts of Interest

The authors declared no conflict of interest.

Author Contribution

Ma G contributed to the conceptualization, the design, data collection and analysis, and the manuscript writing. Shi Y contributed to the revising and editing of the manuscript. All authors contributed to the manuscript and approved the final version.

Abbreviation List

CoI, Community of Inquiry
EFL, English as a Foreign Language
ID, Identification
MOOC, Massive Open Online Courses
SQL, Structured Query Language
TAM, Technology Acceptance Model

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