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Learner Engagement and Related Factors in Virtual Exchange: A Systematic Review of Empirical Studies from 2015-2025

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Abstract. This study focused on students' engagement in virtual exchange. After strict screening, 27 empirical studies were selected for thematic analysis. The results show that students' cognitive engagement is not passive information reception, but rather manifested as self-regulatory strategies. Behavioral engagement is marked by continuous and interactive verbal output. Emotional states include interest, tension, frustration, pauses in speech, feelings of isolation, or brief moments of calm. Participate in interaction and collaboration in VE tasks, establish genuine interpersonal relationships, and gradually form a sense of team belonging and community consciousness. It is related to peers' language proficiency, and higher-proficiency peers may facilitate emotional engagement, while significant ability disparity or cultural misunderstandings are likely to cause anxiety, frustration, and even avoidance. Social engagement refers to the practical process where students actively, continuously, and deeply. In summary, this study confirms that learning engagement in virtual communication is neither a natural occurrence nor a result driven by technology, but a dynamic process influenced by multiple factors.

Keywords: virtual exchange, cognitive engagement, behavioral engagement, emotional engagement, social engagement

1. Introduction

Virtual exchange, an emerging online learning environment in recent years, refers to educational interaction and collaboration among faculty members and learners from different linguacultural and geographic backgrounds [1]. Compared with conventional international exchange programs, virtual exchange is more inclusive, because it can extend the opportunities for cross-cultural communication to students who are unable to study abroad due to objective factors (academic level, social, economic, etc.) [2]. Virtual exchange brings opportunities for internationalization at home, from which students can share local experiences, compare local experiences, negotiate meanings, and jointly address globally shared problems across borders [3].

However, the good effect of virtual exchange is achieved in the process of students ' efficient engagement in learning. Learning engagement refers to the quality and intensity of students' cognitive, behavioral, emotional and social engagement in learning activities [4, 5]. It is an

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important factor affecting the teaching effect, and it is also a key factor in determining students ' learning gains [4].

The multifaceted nature of learner engagement—spanning cognitive, behavioral, emotional, and social dimensions—manifests distinctly within the dynamic and often demanding context of virtual exchange. Cognitive engagement refers to learners' attention, mental effort, self-regulation, and active knowledge construction during interactional tasks [5]. Learners need to take high responsibility cognitively and metacognitively, including planning, monitoring, and evaluating learning through reflection and analysis [6]. Behavior engagement refers to the behaviors that learners can observe in the interactive language task, including the degree of learners' verbal participation in the task (e.g., speaking, questioning, explaining, negotiating meaning) [5]. On the other hand, behavioral engagement is learners' online interaction (e.g., video conferencing, discussion forums, shared documents) [7]. Learners participate in projects together in a novel and dynamic global knowledge sharing space created in VE, conduct virtual communication, and collaborate to develop and implement projects [7]. Emotional engagement is a specific emotion (such as interest, pleasure, anxiety, depression, etc.) that learners show in peer interaction tasks [5]. Studies have shown that the level of peer competence will significantly affect learners' emotional engagement: when working with high-level peers, learners generally have higher positive emotional engagement (such as a stronger sense of interest and task enjoyment) ; when working with low-level peers, learners are more likely to have negative emotional reactions (such as anxiety, frustration, and boredom) [8]. Social engagement refers to the degree to which learners take the initiative to establish positive interpersonal relationships, fulfill their cooperative responsibilities, develop mutual trust and truly feel the sense of belonging in group activities [5]. It emphasizes the promotion of shared knowledge building and mutually supportive interpersonal connections and cooperative behaviors in the learning process. Cross-cultural learning is not a personal practice, but a collaborative process of multi-subject learning - adapting to each other's behavior, enhancing communication confidence [9], promoting social and emotional development (including the improvement of writing ability and the establishment of interpersonal relationships) [10], and ultimately achieving the ideal result of sharing.

The degree of learners' participation in Virtual Exchange (VE) is not only determined by traditional cognitive factors such as language ability, cultural familiarity or digital literacy, but also deeply shaped by the complex interaction between instructional scaffolding design and structural constraints [10]. In the practice of VE, learners are faced with a series of unique and intertwined challenges: the high language complexity of academic tasks themselves [11, 12], the inequality at the infrastructure level continues to restrict the fairness of learners ' participation [13, 14], the time mismatch caused by cross-time zone collaboration and the differences in university calendars in various countries aggravates the difficulty of synchronous interaction [15], and systematic teaching support (such as pre-task design, teacher-guided mediation, etc.) [16, 10].

However, most of the current studies on the influencing factors of learner engagement in VE still show significant fragmentation characteristics. Their results focus on a single dimension and lack systematic integrated analysis. Based on this, this study uses a systematic review method to comprehensively sort out and analyze the multi-dimensional representations of learner engagement in the VE context, including cognitive engagement, behavioral engagement, emotional engagement and social engagement, and deeply identify the key individual factors and situational factors that shape learner engagement. At the same time, it reveals the key gaps in current research, thus pointing out the direction for future theoretical deepening and empirical exploration. Focusing on the above objectives, this study focuses on the following two core research questions :

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RQ1: How do students engage cognitively, behaviorally, affectively, and socially in virtual exchange?

RQ2: What individual and environmental factors influence student engagement in virtual exchange?

2. Methods

2.1. Date source, processing, and analysis

This study uses a systematic literature search strategy to focus on empirical research and theoretical literature published between 2015 and 2025 to explore the performance of learner engagement and its influencing factors in the context of Virtual Exchange (VE), using the terms learner engagement, factors, and virtual exchange. The search covered four authoritative academic databases: Web of Science (WoS, 82 papers), Google Scholar (GS, 46 papers retained after deduplication and correlation screening), EBSCOhost / Academic Search Premier (12 papers), and China Knowledge Network (CNKI, limited to English literature, 15 papers were detected). A total of 155 initial literature records were obtained. Automatic deduplication and manual verification were performed by EndNote, and 33 duplicate articles were excluded, and the remaining 122 articles entered the preliminary screening stage. Inclusion/exclusion criteria were applied to refine the scope: (a) papers must be published in English and (b) must explicitly address learner engagement and/or related factors in virtual exchange. In total, 26 unique papers were selected for further analysis. Inductive thematic analysis was employed, involving identification of key ideas in the introduction/ results/ discussion sections, assignment of keywords or phrases (i.e., coding), and grouping of similar ideas into thematic categories.

3. Results and discussion

3.1. RQ1: students' cognitive, behavioral, affective, and social engagement in virtual exchange

3.1.1. Cognitive engagement

Cognitive engagement in VE is a dynamic and practical state that can be observed, analyzed, and supported during the actual learning process [5]. Its core characteristics can be summarized into two: strategic and regulatory [17, 5]. Cognitive engagement strategies are often manifested as students purposefully applying several simple but effective learning methods to address the challenges in VE, to ensure the accuracy and comprehensibility of their expressions. For example, language learners use homophones to remember vocabulary, ask themselves and answer each other, and use gestures to replace unknown expressions [17]. Foreign language learners actively propose hypotheses and jointly verify them, and embed grammatical questions into task discussions [5]. In many VE projects, students not only read their own group's homework but also actively browse the homework of other groups, and select the best solution by comparing different solutions. As such, VE tasks offer the opportunity for students to review and correct each other's assignments, identify cross-cultural communication issues in each other's writing, provide culturally informed feedback, and reflect on underlying causes before making revisions [18]. These strategies are not fixed routines taught by teachers but are cognitive tools spontaneously explored by students under the pressure of real assignments.

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Self-regulation is manifested as the continuous planning, monitoring, adjustment, and evaluation of learners in the actual task flow, which is the process of students learning and adjusting simultaneously. Among them, "planning" is manifested as students actively negotiating division before the task [5]. "Monitoring" is manifested as students continuously monitoring their understanding status and repeatedly confirming understanding when there is a lack of understanding [17, 5, 18]. "Adjustment" is manifested as students making timely adjustments or corrections based on feedback from peers or teachers when the task fails, or there are errors [17, 5, 18]. "Evaluation" is manifested as students reflecting on which step has gone wrong in the specific task [5].

3.1.2. Behavioral engagement

Behavioral engagement refers to specific actions in interactive language tasks, which can be directly observed and are conducive to the continuous progress of the tasks [5]. Among these, the most core and easily identifiable ones are the actual verbal behaviors that occur during the task, including speaking, asking questions actively, explaining viewpoints, responding to others, clarifying misunderstandings, and negotiating common understanding. The key to this participation does not lie in whether the task is "completed", but in whether the verbal input is sufficient, stable, and continuous, and whether it always serves the current learning goals [9, 19-21].

In VE, students often do not merely observe silently but continuously engage actively through both verbal and non-verbal means. Whether it is discussing cultural symbols in real-time with voices, explaining the customs of hometown festivals [21], or using the target language to try to express their doubts [20], students' verbal participation is not random but always serves the cognitive logic of observing, describing, questioning, relating, and reflecting for the construction of intercultural meaning. With network lag and time differences, synchronous online discussions are often difficult. More difficulties may change students' behavioral patterns, including insufficient English skills, different expression habits, or inconsistent communication rhythm. However, students usually do not wait for the teacher's instructions but find their own solutions: speaking while typing to supplement, slowing down the speaking speed, using simpler words, repeating key words, using gestures or expressions to assist understanding, or even repeatedly modifying their statements until the other party nods to understand [19, 9]. All of these can prove that the behavioral engagement of students in this context is active and adaptive.

3.1.3. Emotional engagement

Emotional engagement refers to the emotions that students display during the process of VE tasks with their peers, based on the specific teaching context, such as being interested, feeling a bit nervous, experiencing frustration, or being momentarily at a loss for words [5]. Emotional engagement is not an accessory in the learning process; it plays an important role, connecting the design of teaching tasks with the arrangement of interactions, and directly influencing students' actual development in terms of cognitive engagement, cross-cultural understanding, and self-identity.

The emotional state of learners during their interactions with peers typically undergoes identifiable phased changes. Initially, students are often anxious because of language, culture, and technology issues. It could be due to concerns about not being able to express themselves fluently [21], concerns about unfamiliarity with the cultural habits of the other party [22], or concerns about their words being misunderstood [23]. Subsequently, students may experience frustration, alienation, or a prolonged period of emotional calm. However, these are not corrective deviations but natural

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reactions in the real situation. With the continuous teaching support and increasing familiarity with VE tasks, these states may gradually turn positive, and they may increase confidence in participating in discussions.

3.1.4. Social engagement

Social engagement describes how students actively interact, collaborate, build relationships, and gradually develop a sense of team belonging within the VE community [5]. It is not a natural manifestation of interpersonal affinity, nor an incidental by-product of the teaching atmosphere, but rather mutual engagement mediated by VE task designs, students' own cultural habits and expression methods [9]. Numerous empirical studies have shown that the manifestations, intensity, and trajectory of students' social engagement are not solely determined by their personality or learning motivation levels, but are systematically rooted in the intentions of the teacher's teaching design, the relevance of the teaching tasks to the students, and whether students can feel psychological support during team collaboration [21-23]. Many VE projects aim at enhancing language skills, and the interactions among students are mostly functional, such as listening to each other's pronunciation, helping each other correct sentences, and explaining different cultural customs. The foundation of the team relationship is based on the common progress of group members, and the sense of team belonging also naturally emerges [9].

3.2. RQ2: individual and environmental factors influencing student engagement in virtual exchange

3.2.1. Individual factors

Student engagement is not uniform across learners or stable within a single learner; rather, it is influenced by many factors, including the students' own cultural background, the language environment they are in (whether English is their native language), the quality of technological conditions, whether they have been treated fairly, and how the teacher designs the tasks and organizes the discussions [9, 21, 23]. Foreign language proficiency dynamically influences how students engage in VE. On one hand, language serves as a prerequisite for interaction, and pairing with peers who have a higher language proficiency can systematically enhance students' engagement because they can communicate more smoothly and clearly, respond promptly, and have a friendly attitude, providing them with a positive interaction experience [5]. Moreover, the role of language evolves naturally throughout VE. In the early stages of a VE project, even students with limited language production ability will make a high level of cognitive engagement, such as actively monitoring input, inferring semantics, and associating existing knowledge. In the middle stage of the course, students have made conscious attempts at language production, respond positively to feedback, and continuously adjust their expressions, resulting in significant increases in behavioral and emotional engagement. However, students with higher language proficiency can attend these activities with ease, while lower-proficiency students may suffer from insufficient understanding of others or failure to express themselves. Therefore, in the later stage of the course, language ability becomes a necessary condition for participating in complex tasks and in-depth discussions, significantly enhancing students' social engagement [18].

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3.2.1.1. Learning experience

The influence of learning experiences on the level of students' engagement in virtual exchanges is dynamic and profound. It is not only rooted in students' past cultural upbringing and language acquisition patterns, such as the thinking habit of "expressions need to be cautious" and reliance on the native language [24], but also occurs in real and even unfriendly learning situations at present, such as network delays, unfamiliarity with platform operation, and limited immediate support from teachers [19]. On this basis, through meticulous teaching design, native language assistance, and progressive guidance, safe steps are built for students' cognitive engagement in choosing learning strategies and understanding concepts, as well as their active participation in speaking and task advancement [22]. Meanwhile, students themselves actively adapt in practice, significantly enhancing their social and emotional engagement. For instance, students voluntarily take turns to be the "tech helper" [19], use the native language to clarify their thoughts, supplement with pictures to explain, reduce expression anxiety, shift from avoiding speaking to "prepared expression" [22], and voluntarily agree to set specific times to log in for interaction and mutual support [5], developing into in-depth team cooperation for negotiating viewpoints and jointly creating solutions [9].

3.2.1.2. Learning motivation

The students' learning motivation is the natural learning state that emerges among students through learning and practice in a real class setting [17, 21]. In VE, the students' learning motivation and their engagement have a mutually reinforcing effect. Learning motivation is the practical outcome of continuous accumulation and reinforcement in each interaction where students are listened to attentively, specifically responded to, and given real meaning. When students realize that "my words have worked", "my ideas have been written into the group report", "the posters we made were actually hung in the community center", "the posters we made were actually hung in the community center", their motivation naturally transcends the passive requirement of completing the task and becomes an active sense of responsibility; their emotional engagement also transforms from the initial cautious observation to the recognition and belonging to their own abilities and teamwork in the continuous positive feedback [9].

3.2.2. Contextual factors

3.2.2.1. Teacher guidance

Teacher guidance is very important in mobilizing student engagement. When the VE teaching process is not simply to bring two classes into one meeting room to carry out some mechanical teaching tasks, but is led by the teacher to design the tasks, clarify the goals, and provide timely feedback [22, 23]. Such tasks make students feel that the learning tasks are closely related to them, and they gain significantly higher levels of achievement, confidence, and interest [9, 21]. Conversely, if students are just paired and left to run automatically by the platform, lacking task instructions, process feedback, and meaningful guidance, many students will quickly lose the motivation for positive engagement [9].

3.2.2.2. Virtual exchange design

VE design is not merely a simple teaching arrangement; it is an educational intervention with a clear practical intention (pedagogical intervention). Its effectiveness depends on whether it can support

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students' engagement in the four dimensions of cognition, emotion, society, and behavior, and enable their mutual reinforcement. Specifically, at the cognitive engagement level, effective task design involves analyzing real problems, shifting students from passive knowledge acquisition to active problem-solving, and stimulating their metacognitive monitoring [18, 21]. At the emotional engagement level, the design of the task should respect students' cultural differences and psychological laws and provide progressive support [17, 22], using structured questions, native language assistance, role cards, etc., to establish a sense of security and efficacy for students without reducing the difficulty of the task [22]. At the social engagement level, the design of the task does not rely on forced grouping but is based on students' natural grouping according to common goals, such as task collaboration based on team division, clarifying roles and information, and data integration, cultural background explanation, progress coordination, etc., where students cultivate mutual trust and collective responsibility in writing [22]. At the behavioral engagement level, the design of the task clearly defines the practical carrier of the operation, such as shooting, annotation, revision, etc., making students' learning behaviors concrete as real outputs, thereby achieving students' progress from completing tasks to taking responsibility [21]. Therefore, high-quality VE task design depends on whether it can create an integrated learning ecosystem centered on social connection, based on emotional security, driven by cognitive challenges, and with specific practice as the exit.

Whether the task design for team collaboration truly requires in-depth team collaboration is an influential factor that directly affects the depth of students' social engagement [9]. If the tasks are merely memorizing words, practicing dialogues, or making a comparison table of "What are the differences between the Spring Festivals of the two countries?", students often only do the necessary parts: answering questions correctly, submitting homework on time, and avoiding mistakes. The interaction remains superficial, and few people ask more questions or say more [21]. However, when the tasks are inseparable from in-depth team collaboration, such as dividing tasks to take photos and compile descriptions of street signs [22], or collaborating to write a bilingual guide for the community [22], students must constantly communicate, negotiate divisions, check each other, and revise together [21]. It is precisely in this real cooperation that classmates gradually become trusted partners, thereby increasing students' social engagement.

4. Research gaps and future research directions

First of all, the existing studies have all focused on their own students, but have not paid attention to the students of the other party. Future research can focus on both sides when collecting data. Secondly, most existing studies have separately examined cognition, behavior, emotion, and social engagement without conducting empirical analysis on their dynamic integration mechanism. For instance, does high emotional engagement necessarily lead to deep social engagement? How do cognitive regulation strategies affect social engagement? In this sense, comprehensive intervention measures are not available to enhance student engagement in a coordinated manner.

5. Conclusions

Students engage in VE cognitively, behaviorally, emotionally, and socially to complete VE tasks. Cognitive engagement is manifested as active and strategic practice centered on self-regulation. Behavioral engagement is demonstrated by actively, continuously, and flexibly engaging in verbal interaction in the target language, and being able to spontaneously adjust strategies in response to real challenges. Emotional engagement is highly sensitive to the matching degree of peer abilities,

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and is prone to anxiety and avoidance due to proficiency differences or cultural misinterpretations. Social engagement deeply relies on the appropriateness of teaching guidance, clarity of learning objectives, and quality of teaching practice. Various individual and contextual factors influence student engagement. Especially, the absence of timely and appropriate support may lead to superficial interaction. Therefore, the key to enhancing the effectiveness of virtual exchange lies in building a collaborative support system and coordinating and optimizing the mechanisms of teacher support, teaching design, technical support, and intercultural collaboration.

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