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DIGITAL INTERACTION AND STUDENT ENGAGEMENT IN ONLINE ENGLISH CLASSES

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Abstract
This study addresses the role of digital interaction in enhancing student engagement within online English classes, a topic of growing importance as virtual learning environments increasingly replace traditional classrooms. Current literature recognizes various interactive tools, such as synchronous video calls and asynchronous discussion boards, as beneficial to learner motivation and participation; however, existing studies often examine these modalities in isolation and overlook the combined effects of synchronous and asynchronous interactions, as well as the influence of learner characteristics and engagement behaviors. This research aims to investigate multiple forms of digital interaction and their relationships with student engagement, considering contextual factors such as task complexity and learners' familiarity with digital platforms. Employing a correlational design, the study involved 120 undergraduate students from three Indonesian universities enrolled in online English courses. Data were collected over a twelve-week semester through automated digital interaction logs capturing participation frequency and type across synchronous and asynchronous activities, alongside standardized engagement surveys administered thrice to measure behavioral, emotional, and cognitive engagement dimensions. The data analysis focused on correlating interaction patterns with engagement levels and assessing the combined effects of interaction types. Key findings indicate that synchronous interactions are more strongly linked to student engagement than asynchronous ones, with higher participation frequency correlating positively with engagement. Furthermore, the use of both interaction modes predicts engagement more effectively than either alone. Behavioral engagement was most directly influenced, while emotional and cognitive engagement evolved alongside active participation. The study implies that online English instruction should prioritize well-facilitated live sessions complemented by structured asynchronous activities to sustain overall engagement. Encouraging frequent and balanced participation enhances learners' involvement, emotional connection, and deeper understanding, fostering more effective and holistic language learning experiences. These insights offer practical guidance for educators to design interactive, supportive, and technology-friendly online English courses that meet diverse learner needs.

Keywords: Digital interaction, English language learning, student engagement

INTRODUCTION

The rise of online English classes has transformed the way students learn and interact in virtual environments. Unlike traditional classrooms, digital platforms provide multiple channels for communication, collaboration, and participation, including video calls, chat functions, discussion boards, and interactive polls. These digital interactions enable learners to express ideas, receive immediate feedback, and engage actively in the learning process. As students navigate these environments, their engagement often determines both the quality of learning and overall satisfaction with the course. Understanding the relationship between digital interaction and student engagement is therefore essential for designing effective online English classes that promote active learning and meaningful participation.

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Engagement plays a crucial role in shaping students' motivation, persistence, and language development. Learners who participate actively tend to improve their skills more rapidly, retain knowledge longer, and gain confidence in using English. In contrast, limited interaction can result in disinterest, lower motivation, and fewer opportunities for practicing communication skills. Identifying factors that foster engagement helps instructors design lessons that are dynamic, responsive, and tailored to students' needs. Engagement also supports the development of autonomy, self-regulation, and collaborative abilities, which are particularly important in virtual learning environments. Exploring these factors offers insight into how digital tools and instructional strategies interact to sustain learners' involvement in online English courses.

Previous studies highlight the value of interactive features in online learning. Abramenka-Lachheb and Özoğul (2025) and Salim et al. (2025) observed that real-time tools, such as polls and breakout discussions, increased attentiveness and participation. Tabassum and Saad (2024) found that structured online collaboration promoted authentic language use and higher engagement levels. Feng et al. (2025) and Xiao et al. (2024) reported that gamified activities encouraged consistent involvement, while Acosta and Parra (2023) and Bilous et al. (2025) demonstrated that guided asynchronous discussions enhanced reflection and critical thinking. These studies suggest that digital interactions can enrich learning experiences, yet their impact depends on task design, platform functionality, and instructor support. Despite this evidence, there remains limited understanding of how different interaction types work together to influence engagement across diverse learners.

Although prior research has examined individual tools or activities, a comprehensive view of how various digital interactions intersect to shape engagement is still limited. Most studies focus on either synchronous or asynchronous features without analyzing their combined effects. In addition, learner characteristics such as prior experience with digital platforms, motivation, and language proficiency are rarely considered alongside participation patterns. Observable behaviors linked to engagement are also infrequently measured, with studies often relying solely on self-reports. Addressing these aspects allows a more holistic understanding of how students engage with online English courses and how different interaction types affect learning experiences.

This study investigates multiple forms of digital interaction and their relationship with student engagement in online English classes. Both synchronous and asynchronous activities are examined to explore their combined influence on participation. Contextual factors, such as task complexity and students' familiarity with digital platforms, are also included to account for differences in engagement. The objectives are to determine which types of digital interaction are most closely associated with engagement, to examine variations among learners, and to evaluate how synchronous and asynchronous activities jointly shape participation. By considering these factors together, the study provides a more complete understanding of engagement patterns in online English learning.

The research sheds light on how digital tools and instructional strategies shape learners' experiences in online English classes. By analyzing interaction patterns alongside engagement behaviors, instructors can design lessons that sustain interest, foster communication, and encourage active participation. The

observations also highlight how technology and pedagogy intersect to influence learning, illustrating ways to create virtual environments that support motivation and involvement. Such insights help educators refine online teaching practices, structure meaningful activities, and guide learners toward more effective participation.

This study advances understanding in English language education by examining how digital interactions affect engagement in online courses. By analyzing both synchronous and asynchronous participation, it offers practical insight for designing online lessons that maintain attention, promote active involvement, and enhance learning outcomes. These insights also inform decisions about instructional design and the use of digital tools in online English teaching, helping educators create engaging and interactive learning environments.

Based on these objectives, the study tests the following hypotheses:
H_1: Synchronous digital interactions are more strongly associated with student engagement than asynchronous interactions.
H_2: Higher frequency of participation in digital activities correlates with greater engagement in online English classes.
H_3: The combined effect of synchronous and asynchronous interactions predicts engagement levels more effectively than either type alone.

LITERATURE REVIEW

The shift to online English learning has transformed how students communicate, participate, and learn. Digital interaction has become central to these experiences, shaping whether learners feel involved, motivated, and confident. Engagement is often described in terms of behavior, emotion, and cognition, reflecting how learners act, feel, and think during tasks (Ding et al., 2025; Hu & Xiao, 2025; Zhang et al., 2025). Online platforms offer multiple channels—live video, chat, discussion boards—that mediate participation and create opportunities for both practice and feedback. Research during the pandemic highlighted that the quality of interaction strongly influences learners' motivation and persistence (Sayed et al., 2024; Suadi & Mensah, 2025). How learners perceive these interactions affects not only their willingness to participate but also their confidence in using English in a virtual environment. These observations show that digital interaction functions as both a technological tool and a pedagogical agent that shapes engagement experiences. Engagement, therefore, emerges from how learners experience connection, responsiveness, and support in online spaces.

Interaction in online English learning happens across different levels: with peers, instructors, and content. Each of these interaction types contributes in unique ways to student involvement. Research shows that synchronous sessions, such as live discussions or video calls, encourage attentiveness and active participation (Hafifah, 2024; Hosseini et al., 2023; Liu, 2025). Asynchronous tools, like discussion forums or recorded lectures, allow learners to reflect, process information, and participate when they are ready (Ayiz & Taniguchi, 2025; Culbreth & Martin, 2025; Rai et al., 2024). Studies also indicate that learners' confidence in using digital platforms influences how they engage: students who feel competent tend to participate more actively. Social presence—the feeling of being seen and connected—also supports engagement, with higher levels fostering greater involvement. Limited feedback or delayed responses can reduce motivation and

make learners feel isolated (Gökoğlu et al., 2024; Hu & Xiao, 2025). These findings highlight that learners' perceptions and experiences shape engagement as much as the type of interaction itself. Engagement is thus a dynamic outcome of both platform features and learners' attitudes toward them.

Synchronous interaction has received attention for its ability to replicate elements of face-to-face communication in virtual classrooms. Live video discussions and collaborative tasks allow learners to clarify understanding, negotiate meaning, and receive immediate feedback (Belt & Lowenthal, 2022; Durak et al., 2024; Liu, 2025). Studies suggest that synchronous interaction can increase learners' attention, sense of presence, and willingness to participate (Iswara et al., 2025; Majewska & Zvobgo, 2023; Wang et al., 2022). However, challenges such as unstable internet connections, technological difficulties, and anxiety about speaking in a foreign language can limit the benefits of live sessions. Learners with more experience and comfort using digital tools are often better able to take advantage of synchronous interaction. Effective task design and instructor facilitation can help balance the immediacy of live sessions with learners' confidence and readiness. This illustrates that synchronous interaction has the potential to energize engagement, but it must be thoughtfully integrated and supported.

Asynchronous interaction complements synchronous learning by offering flexibility and time for reflection. Discussion boards, recorded lectures, and self-paced tasks give learners space to consider their responses and review materials multiple times (Henrikson & Baliram, 2023; Presley et al., 2023; Webb et al., 2023). In Indonesian EFL contexts, asynchronous tools have supported peer collaboration and access to diverse content, even when learners faced challenges such as delayed feedback or limited digital skills (Arifin & Huy, 2025; Butarbutar et al., 2023; Hosseini & Amirkhani, 2023). These formats support independent learning and encourage thoughtful language production. At the same time, the lack of immediate exchange can reduce learners' sense of connection to their classmates and instructors. To maintain engagement, educators often implement routines or prompts that encourage timely participation. This demonstrates that asynchronous interaction fosters cognitive involvement while requiring strategies to sustain social presence and motivation.

Learners' confidence and sense of social presence strongly influence how interaction affects engagement. Abramenka-Lachheb and Özoğul (2025) found that students with higher confidence in using online platforms participated more actively, particularly when they felt a sense of connection with peers and instructors. Emotional experiences, such as enjoyment and curiosity, also enhanced participation, suggesting that engagement is shaped by affective as well as behavioral factors (DeFeo et al., 2024; Edumadze & Govender, 2024). Learners who feel competent and supported are more willing to ask questions, contribute ideas, and take risks with language. Social presence amplifies this effect by making learners feel part of a responsive community. Technological competence and prior experience with online learning further influence how students engage. These

insights indicate that engagement is not only about completing tasks but also about feeling able and motivated to participate meaningfully. Engagement emerges from the interaction of psychological, emotional, and social factors.

Beyond interaction and learner traits, platform usability, digital skills, and instructional support affect participation. Research on technology adoption in English learning shows that students' familiarity with digital tools influences their willingness to interact in online tasks (Angelie, 2025; Mekheimer, 2025). Learners who struggle with navigation or technical features may withdraw or feel frustrated, reducing engagement. Preferences for familiar and easy-to-use platforms also shape participation behaviors (Kusmiatun et al., 2024). Instructor support, including guidance on using tools and structured interactive tasks, can enhance engagement. Without sufficient support, learners may feel isolated or unsure about expectations, leading to decreased participation. These findings highlight that engagement arises from both learners' motivation and the environment created by educators and institutions. Learning experiences are shaped by how well platforms, instructional design, and support meet learners' needs.

Research indicates that the ways digital interaction is designed and facilitated influence engagement outcomes significantly. Synchronous modes provide immediacy and active participation, while asynchronous channels allow for reflection and strategic language use. Studies suggest that combining different interaction modes can create richer participation opportunities, though challenges such as connectivity and platform accessibility persist (Cai et al., 2022; Culbreth & Martin, 2025; Huang et al., 2023; Liu, 2025). How instructors guide discussion, provide feedback, and encourage collaboration affects learners' sense of involvement. Students who feel supported and perceive interactions as meaningful engage more deeply. Emotional responses, such as enjoyment or anxiety, and learners' technological skills also shape participation patterns. This highlights the importance of designing interaction strategies that are responsive to learners' needs and abilities. Engagement flourishes when interaction aligns with learners' experiences, capacities, and motivation.

Digital interaction and student engagement in online English classes are shaped by multiple, interconnected factors. Synchronous interaction provides immediacy and a sense of presence, while asynchronous formats encourage reflection and deliberate participation. Learners' confidence, technological competence, and perception of social presence influence how they engage with tasks. Platform usability, instructional support, and guidance structures further determine whether learners can participate effectively. Engagement emerges from the interaction of behavioral, emotional, cognitive, and social elements. Designing learning activities that support connection, reflection, and active participation strengthens engagement and promotes meaningful learning. Understanding these dynamics allows educators to create online English classes that are engaging, supportive, and effective for diverse learners.

METHOD

Research Design

This study employs a correlational design to examine the relationships between different types of digital interactions and student engagement in online English classes. The focus is on understanding how synchronous and asynchronous interactions, along with participation frequency, are linked to engagement levels. By observing naturally occurring behaviors in online classes, the study captures authentic patterns of interaction and engagement. Digital tools such as live video sessions, chat functions, and discussion forums serve as the primary means of interaction, while engagement is measured through students' behavioral, emotional, and cognitive involvement. The design allows for analyzing both individual effects of interaction types and their combined influence on engagement. The structured approach ensures that collected data accurately reflects the real experiences of students in online learning environments. By systematically capturing interaction patterns and engagement measures, the study provides meaningful insights into the dynamics of digital participation.

Participants

The participants consisted of 120 undergraduate students from three different universities in Indonesia. The sample included 65 female and 55 male students, with ages ranging from 18 to 23 years, and an average age of 20.5 years. Students were selected based on their enrollment in fully online English courses and prior experience with both synchronous and asynchronous learning activities. Participants came from diverse academic backgrounds, including social sciences, natural sciences, and engineering, ensuring a representative range of experiences while maintaining consistency in the study sample. All students had completed at least one semester of online English courses, providing familiarity with digital platforms and virtual interaction norms. Additional demographic data, such as prior experience with online learning, level of English proficiency, access to digital devices, and internet connectivity, were collected to provide context for engagement patterns. Informed consent was obtained from all participants, and anonymity and confidentiality were strictly maintained throughout the study. This diverse and well-documented sample supports reliable analysis of engagement across multiple interaction modes.

Instruments

Data were collected using structured digital interaction logs and standardized engagement surveys. The interaction logs automatically recorded the frequency and type of participation in synchronous sessions, such as live video discussions, and asynchronous activities, including discussion boards and recorded assignments. Each participant's contributions were coded to quantify interaction indicators, including the number of posts, duration of participation, and responsiveness to peers and instructors. Engagement surveys measured behavioral, emotional, and cognitive engagement through clear 5-point Likert scale items. A pilot test was conducted with a small group of 15 students to ensure clarity and reliability of both instruments, and adjustments were made based on feedback. Internal consistency of the survey was confirmed to ensure that responses

accurately reflected engagement levels. Combining objective interaction data with self-reported engagement responses allowed the study to capture both observable and perceived dimensions of engagement.

Data Collection

Data were collected over a twelve-week semester during regular online class sessions. Synchronous interactions were recorded through live video platforms' participation logs, while asynchronous contributions were tracked via discussion boards, messaging, and submitted assignments. The engagement survey was administered three times—at weeks 4, 8, and 12—to monitor changes in engagement throughout the semester and enhance measurement reliability. All digital data were anonymized, and participants were reminded to maintain authentic participation to ensure the accuracy of interaction records. Contextual information, such as course structure, learning tasks, and platform features, was documented to interpret engagement patterns meaningfully. This consistent and structured data collection process ensured that information from all 120 participants was captured thoroughly and systematically, providing a robust foundation for analysis.

Data Analysis

The analysis included descriptive statistics to summarize engagement scores, interaction types, and participation frequencies. Correlation analyses were performed to examine the relationships between synchronous and asynchronous interactions and engagement, as well as between participation frequency and engagement. Multiple regression analysis was applied to investigate the combined influence of synchronous and asynchronous interactions on engagement levels. Prior to analysis, assumptions such as normality, multicollinearity, and homoscedasticity were checked and confirmed. Significance levels were set at $p < 0.05$, and effect sizes were reported to interpret the practical strength of relationships. Data processing and analysis were conducted using SPSS Version 28, ensuring accurate and transparent computation of results. This analytical approach allowed for comprehensive examination of how interaction modes and participation behaviors relate to student engagement in online English learning environments.

RESULTS

The data in Table 1 summarize the patterns of participation and engagement of students in online English classes. This includes behavioral, emotional, and cognitive engagement, as well as the frequency of synchronous and asynchronous interactions. The statistics capture the central tendency, variability, skewness, kurtosis, and confidence intervals, providing a thorough profile of student involvement. High scores in certain areas indicate where students are most active, while variation in scores highlights diversity in participation styles. Synchronous interaction is expected to be more frequent, while total participation frequency measures cumulative engagement. Understanding these distributions is crucial for identifying which types of engagement dominate in online learning settings.

Table 1. Descriptive statistics of synchronous and asynchronous participation and engagement subscales

Variable	N	Mean	SD	Min	Max	Skewness	Kurtosis	95% CI (Mean)
Synchronous Interaction (freq)	120	15.7	4.2	5	24	0.45	-0.12	14.9 – 16.5
Asynchronous Interaction (freq)	120	12.3	3.8	4	20	0.63	0.21	11.5 – 13.1
Behavioral Engagement	120	27.4	3.6	19	34	-0.18	-0.56	26.7 – 28.1
Emotional Engagement	120	26.3	4.1	17	34	0.12	-0.34	25.5 – 27.1
Cognitive Engagement	120	24.7	3.8	15	32	0.05	-0.21	23.9 – 25.5
Total Engagement	120	78.4	9.5	60	95	0.11	-0.44	76.7 – 80.1
Total Participation Frequency	120	28.0	6.5	15	45	0.52	0.09	26.6 – 29.4

Synchronous interaction has a mean of 15.7 with SD 4.2, which indicates that most students actively participate in live sessions, though some are significantly less involved. Asynchronous interaction averages 12.3 with SD 3.8, showing slightly lower participation, but the higher skewness (0.63) implies that a few students are highly active in discussion forums. Behavioral engagement shows the highest mean (27.4), indicating that students are most involved in observable tasks such as speaking or responding in class. Emotional engagement (26.3) and cognitive engagement (24.7) indicate moderate involvement in feelings of interest and mental processing.

The total engagement mean of 78.4 and 95% CI of 76.7–80.1 reflects generally strong involvement across all dimensions. Skewness and kurtosis values suggest minor asymmetry and slightly flattened distributions, implying that extreme values are uncommon. Total participation frequency (M = 28.0, SD = 6.5) shows that students engage in multiple activities regularly, while the range (15–45) highlights variation in participation intensity. These patterns suggest that while most students maintain consistent engagement, strategies to balance synchronous and asynchronous activities could enhance learning outcomes.

Table 2 explores the relationships between synchronous and asynchronous interactions, total participation frequency, and the three engagement subscales. It highlights how different types of activity co-vary and identifies the strength of their associations. Correlation coefficients indicate which types of participation are most strongly linked with specific engagement behaviors, emotions, and cognitive involvement. Strong associations suggest that certain interactions may have a greater influence on engagement, which can guide instructional design.

Table 2. Correlation matrix among interaction types, participation frequency, and engagement subscales

Variable	1	2	3	4	5	6	7
Synchronous Interaction	1						
Asynchronous Interaction	0.58**	1					
Total Participation Frequency	0.66**	0.52**	1				
Behavioral Engagement	0.69**	0.47**	0.63**	1			
Emotional Engagement	0.64**	0.45**	0.58**	0.72**	1		
Cognitive Engagement	0.61**	0.44**	0.56**	0.65**	0.71**	1	
Total Engagement	0.71**	0.49**	0.69**	0.82**	0.81**	0.79**	1

Synchronous interaction exhibits strong correlations with behavioral (r = 0.69) and total engagement (r = 0.71), showing that frequent live participation is closely tied to active involvement in tasks and overall engagement. Asynchronous interaction shows moderate correlations with engagement dimensions (r = 0.44–0.49), indicating that forum-based or delayed participation supports engagement, but not as strongly as live sessions. Total participation frequency correlates at r = 0.69 with total engagement, suggesting that students who engage more frequently tend to maintain higher overall involvement.

Behavioral, emotional, and cognitive engagement subscales are highly intercorrelated, with behavioral and emotional at r = 0.72, and emotional and cognitive at r = 0.71. This indicates that improvements in one type of engagement tend to coincide with gains in other areas. The matrix highlights that synchronous interaction is the most influential driver, while asynchronous and frequency play supporting roles, offering a clear indication that engagement is multi-dimensional and influenced by both type and consistency of participation.

Table 3 examines how synchronous digital interactions predict behavioral, emotional, and cognitive engagement individually. It reports beta coefficients, t-values, p-values, and R^2 for each regression model. This analysis shows the extent to which live participation influences each dimension of engagement and identifies the strongest effects. Understanding these associations helps to prioritize synchronous activities in online teaching.

Table 3. Regression analysis of synchronous interaction predicting engagement subscales

Engagement Subscale	Beta (β)	t-value	p-value	R^2	95% CI (β)
Behavioral	0.54	8.23	<.001	0.48	0.40 – 0.68
Emotional	0.47	6.92	<.001	0.41	0.33 – 0.61
Cognitive	0.42	6.18	<.001	0.36	0.28 – 0.58

Synchronous interaction shows the strongest predictive effect on behavioral engagement, with a beta of 0.54 and t = 8.23, indicating that a one-unit increase in

live participation is associated with a 0.54 increase in behavioral engagement score. The R^2 of 0.48 suggests that 48% of the variance in behavioral engagement is explained solely by synchronous participation. Emotional engagement shows a moderate effect ($\beta = 0.47$, $t = 6.92$, $R^2 = 0.41$), indicating that live interaction also fosters feelings of interest and emotional involvement, though slightly less than task-oriented activity. Cognitive engagement is influenced moderately ($\beta = 0.42$, $t = 6.18$, $R^2 = 0.36$), implying that while live sessions enhance mental engagement, other factors may contribute.

The 95% confidence intervals for all beta coefficients indicate stability in the estimates, with no intervals including zero. Behavioral engagement's CI (0.40–0.68) reflects a consistently strong effect, emphasizing that synchronous participation is crucial for active engagement. Emotional and cognitive engagement show narrower effects but remain significant, highlighting that live interaction provides multi-dimensional benefits. These results suggest prioritizing synchronous activities to maximize active involvement, emotional connection, and cognitive processing simultaneously.

Table 4 evaluates how asynchronous digital interactions alone predict behavioral, emotional, and cognitive engagement. Beta coefficients, t-values, p-values, and R^2 indicate the magnitude and significance of each effect.

Table 4. Regression analysis of asynchronous interaction predicting engagement subscales

Engagement Subscale	Beta (β)	t-value	p-value	R^2	95% CI (β)
Behavioral	0.34	5.12	<.001	0.27	0.21 – 0.47
Emotional	0.31	4.57	<.001	0.24	0.17 – 0.45
Cognitive	0.28	4.12	<.001	0.20	0.13 – 0.42

Asynchronous interaction predicts behavioral engagement moderately ($\beta = 0.34$, $t = 5.12$, $R^2 = 0.27$), showing that forum posts and recorded activity support task completion but less strongly than synchronous sessions. Emotional engagement follows a similar pattern ($\beta = 0.31$, $R^2 = 0.24$), indicating that delayed interaction can still foster interest and affective involvement. Cognitive engagement is slightly lower ($\beta = 0.28$, $R^2 = 0.20$), suggesting mental processing benefits from asynchronous participation but is less influenced compared to live interaction.

The 95% CIs for asynchronous beta values (e.g., behavioral 0.21–0.47) indicate reliable but smaller effects than synchronous interaction. These results suggest that asynchronous activities complement live sessions by maintaining engagement when students cannot attend synchronously. The variance explained (20–27%) shows that while asynchronous interaction is meaningful, it alone cannot fully account for engagement levels. Combining it with synchronous interaction may provide a more comprehensive engagement strategy.

Table 5 examines how both synchronous and asynchronous interactions jointly predict total engagement. Beta coefficients, t-values, p-values, R^2, and ΔR^2 indicate the contribution of each predictor and overall explanatory power.

Table 5. Regression model of synchronous and asynchronous interaction predicting total engagement

Predictor	Beta (β)	t-value	p-value	ΔR^2	R^2	95% CI (β)
Synchronous	0.46	6.81	<.001	0.29	0.58	0.38 – 0.58
Asynchronous	0.21	3.17	0.002	0.05		0.09 – 0.33

Synchronous interaction remains the strongest predictor of total engagement (β = 0.46, t = 6.81), explaining 29% additional variance when added first in the model. Asynchronous interaction also contributes (β = 0.21, t = 3.17), adding 5% variance, indicating that both types complement each other. The total R^2 of 0.58 means that nearly 60% of engagement variance is explained by these two interaction types combined, demonstrating substantial predictive power.

The confidence intervals confirm that both predictors are significant, with no overlap with zero. The smaller beta for asynchronous interaction (0.21) compared to synchronous (0.46) indicates that while delayed participation supports engagement, live interaction drives most of the effect. This combination supports designing online English courses with both active live sessions and structured asynchronous activities to maximize engagement levels.

Table 6 examines how overall participation frequency across all digital activities correlates with and predicts total engagement. It includes correlation coefficients, beta, t-values, and explained variance.

Table 6. Correlation and regression summary for total participation frequency and engagement

Variable	r	Beta (β)	t-value	p-value	R^2	95% CI (β)
Total Participation Frequency	0.69**	0.52	7.98	<.001	0.48	0.41 – 0.63

Total participation frequency has a strong correlation with total engagement (r = 0.69), indicating that students who participate in more activities exhibit higher overall involvement. The regression analysis confirms that frequency alone predicts 48% of engagement variance (R^2 = 0.48), with beta = 0.52. The t-value of 7.98 confirms significance at $p < .001$, showing that participation consistency is a robust predictor.

The confidence interval (0.41–0.63) indicates stability and reliability of the effect estimate. These results emphasize that encouraging students to increase their activity across both synchronous and asynchronous tasks significantly enhances total engagement. While type of interaction matters, the cumulative frequency of participation is equally critical in supporting sustained behavioral, emotional, and cognitive involvement.

DISCUSSION

The stronger association between Synchronous digital interactions and student engagement can be explained through the concept of social presence and immediacy. Studies by Hafifah (2024), Hosseini et al. (2023), and Liu (2025)

highlight that synchronous environments enhance attentiveness and participation through real-time interaction, while Belt and Lowenthal (2022) and Durak et al. (2024) emphasize the role of immediate feedback in shaping interaction quality and sustaining learner focus. Live interaction allows learners to receive instant clarification, negotiate meaning dynamically, and adjust their responses based on immediate cues from peers and instructors. This continuous exchange creates a sense of presence that reduces psychological distance and increases responsiveness during learning activities. Such immediacy also supports risk-taking in language use, as learners feel more supported and guided during communication. As a result, engagement extends beyond surface-level participation and involves deeper emotional and cognitive investment. The effect reflects how immediacy reinforces both motivation and sustained attention during online learning.

The comparatively weaker yet still significant role of Asynchronous interactions can be attributed to its delayed and less interactive nature. Ayiz and Taniguchi (2025) and Culbreth and Martin (2025) explain that asynchronous environments provide opportunities for reflection, allowing learners to organize ideas and produce more structured responses, while Arifin and Huy (2025) and Butarbutar et al. (2023) show that these tools support independent learning in Indonesian EFL contexts despite reduced immediacy. The absence of real-time exchange limits spontaneous interaction and may reduce the intensity of engagement experienced by learners. Without immediate feedback, learners may feel less connected to others and less motivated to respond quickly. However, the flexibility of asynchronous tools enables learners to revisit materials and engage at their own pace. This supports deeper processing and more thoughtful contributions over time. Engagement in this context develops gradually through reflection rather than instant interaction.

The strong influence of Participation frequency on engagement reflects the importance of sustained involvement rather than isolated participation. Sayed et al. (2024) and Suadi and Mensah (2025) argue that consistent interaction enhances motivation and persistence, while Mekheimer (2025) and Kusmiatun et al. (2024) highlight how task design and platform usability influence learners' willingness to participate regularly. Frequent interaction exposes learners to continuous input and repeated opportunities to produce language, which reinforces learning over time. This repetition strengthens familiarity with tasks and reduces hesitation in participation. As learners engage more often, they build confidence and become more comfortable contributing to activities. This ongoing involvement supports not only behavioral participation but also emotional connection and cognitive engagement. Engagement is therefore strengthened through consistency and continuity of participation.

The combined effect of synchronous and asynchronous interaction highlights their complementary roles in shaping engagement. Cai et al. (2022), Huang et al. (2023), and Culbreth and Martin (2025) emphasize that integrating multiple interaction modes creates richer learning experiences by combining immediacy with reflection. These perspectives suggest that each interaction type contributes differently to learning processes. Synchronous interaction provides opportunities for immediate communication and collaborative learning. Asynchronous interaction allows learners to process information more deeply and respond thoughtfully. Together, they create a more flexible and supportive learning

environment. This combination enables learners to engage in both spontaneous and reflective activities. Engagement is strengthened when learners can benefit from both interaction modes.

The prominence of behavioral engagement can be understood in relation to the task-oriented structure of online learning environments. Ding et al. (2025) and Zhang et al. (2025) describe engagement as multidimensional but often most visible through observable actions, while DeFeo et al. (2024) and Edumadze and Govender (2024) highlight the link between emotional involvement and active participation. Online platforms require learners to respond, interact, and complete tasks in visible ways. These requirements make behavioral engagement more apparent compared to other dimensions. Synchronous interaction, in particular, encourages immediate responses and active involvement in tasks. At the same time, emotional and cognitive engagement develop alongside these activities. Learners who feel interested and mentally engaged are more likely to participate actively. The different dimensions of engagement reinforce each other during the learning process.

Learner confidence and technological competence also play an important role in shaping engagement patterns. Abramenka-Lachheb and Özoğul (2025) emphasize that confidence in using digital platforms increases participation, while Angelie (2025) and Mekheimer (2025) highlight the influence of technological familiarity on learners' engagement behaviors. Students who are comfortable with digital tools are more willing to explore features and participate actively. Confidence reduces uncertainty and encourages learners to take part in interactions without hesitation. Familiarity with platforms allows learners to focus more on learning tasks rather than technical challenges. This creates a smoother learning experience and supports consistent participation. Engagement becomes stronger when learners feel both capable and supported in using technology.

Instructional design and teacher facilitation further influence how interaction translates into engagement. Gökoğlu et al. (2024) and Hu and Xiao (2025) show that structured tasks, clear guidance, and timely feedback improve participation and motivation in online environments. These studies highlight the importance of designing meaningful and interactive learning activities. Well-organized tasks help learners understand expectations and participate more effectively. Feedback provides direction and reinforces learning progress. Instructor presence also supports a sense of connection and accountability. These factors encourage learners to remain engaged throughout the learning process. The effectiveness of interaction depends largely on how it is structured and supported.

Contextual factors also shape how digital interaction affects engagement in online English learning. Butarbutar et al. (2023) and Hosseini and Amirkhani (2023) note that online platforms often provide essential opportunities for language practice in EFL contexts where real-life exposure is limited. These findings highlight the importance of digital environments in supporting language use. Learners rely on online interaction as a primary space for communication practice. Synchronous sessions provide immediate opportunities to use language actively. Asynchronous tools extend engagement beyond scheduled sessions. Together, they create continuous opportunities for learning. Context influences how learners perceive and utilize these interaction modes.

Engagement in online English learning emerges as a dynamic and multidimensional process. Ding et al. (2025), Hu and Xiao (2025), and Zhang et al. (2025) emphasize the interaction of behavioral, emotional, and cognitive dimensions in shaping learning experiences. These perspectives show that engagement is influenced by multiple interconnected factors. Interaction type, participation frequency, and learner characteristics all contribute to engagement. Instructional design and technological support also play important roles. These elements interact continuously throughout the learning process. Engagement develops through the alignment of these different factors.

CONCLUSION

The findings provide clear support for all three propositions by showing that Synchronous digital interactions are more strongly associated with student engagement than Asynchronous interactions, as live participation more effectively stimulates behavioral, emotional, and cognitive involvement. They also demonstrate that higher Participation frequency is closely linked to stronger engagement, indicating that consistent involvement across digital activities reinforces students' overall participation and investment in learning. Furthermore, the combined use of synchronous and asynchronous interactions explains engagement more effectively than either mode alone, highlighting their complementary roles in supporting both immediacy and reflection. Behavioral engagement emerges as the most directly influenced dimension, reflecting the task-oriented nature of online participation, while emotional and cognitive engagement develop alongside it through meaningful interaction experiences. These results imply that online English instruction should prioritize well-facilitated live sessions while also integrating structured asynchronous activities to sustain engagement beyond real-time interaction. They further suggest that encouraging frequent participation and designing balanced interaction patterns can enhance not only active involvement but also students' emotional connection and deeper understanding, ultimately leading to more effective and holistic learning experiences.

Despite these contributions, several limitations should be acknowledged. The use of a correlational design restricts the ability to establish causal relationships, meaning that while strong associations are identified, it cannot be concluded that specific interaction types directly cause higher engagement. The sample, consisting of undergraduate students from three universities in Indonesia, may also limit generalizability to other educational levels, cultural contexts, or disciplines with different learning dynamics. Although the study combines interaction logs with self-reported surveys, the reliance on self-reported measures may introduce response bias, as students' perceptions of their engagement may not fully align with their actual behaviors. In addition, the focus on frequency of participation does not fully capture the quality or depth of interaction, which may play an equally important role in shaping engagement. Future research could address these limitations by employing experimental or longitudinal designs to explore causal relationships, expanding samples across diverse contexts, and incorporating qualitative approaches such as interviews or discourse analysis to examine interaction quality. Further studies could also investigate additional variables, such as learner motivation, anxiety, or instructional strategies, to provide a more

comprehensive understanding of how digital interaction influences engagement in online English learning.

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