

Exploring how video conferencing impacts students' cognitive, emotional, and behavioral engagement

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ABSTRACT

Video conferencing has become an essential tool in the realm of education, offering educators a plethora of features to enhance student learning. This study delved into the comparative impact of video conferencing and Learning Management Systems (LMS) on student engagement in online education. The primary objective was to discern the most effective mode of communication for fostering student engagement in online learning, examining cognitive, emotional, and behavioral dimensions of engagement. The researchers used a quasi-experimental design with a historical cohort control group to compare the effectiveness of Zoom and Moodle (LMS) on student engagement. The study involved English education students from a private university in Indonesia, with 20 students in each group. Data collection included recording online interactions, conducting semi-structured interviews, and administering a Likert-style survey. Data analysis involved content analysis, thematic analysis, and the Mann-Whitney U test. The findings underscored the advantages of utilizing Zoom, particularly in nurturing interpersonal relationships among students. Notably, the platform enhanced intimacy and interactivity within the learning environment, bolstering students' intrinsic motivation. Moreover, indicators such as creativity and idea exchange pointed towards heightened cognitive engagement facilitated by Zoom. Additionally, Zoom emerged as a practical tool for fostering social interaction and stimulating higher-order thinking during discussions. Consequently, these results provide compelling evidence supporting the integration of Zoom to enrich learning experiences and promote deeper engagement among students, both practically and theoretically.

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ARTICLE INFO

Keywords:

English as a Foreign Language; Learning Management System; Online Learning Students Engagement; Video Conference

Article History:

Received: 09 June 2024

Revised: 01 July 2024

Accepted: 12 July 2024

Published: 01 September 2024

How to Cite in APA Style:

Hastom, T., Kholid, M., F., N., Mulyah, P., Septiyana, L., Andewi, W. (2024). Exploring how video conferencing impacts students' cognitive, emotional, and behavioral engagement. *Journal of Educational Management and Instruction*, 4(2), 225-237.

Introduction

Integration with mobile broadband and smartphone access has significantly facilitated the use of video conferencing in academic online learning activities. This study focuses on Zoom as the video conferencing tool under review. Zoom's user base has seen substantial growth, with 3.3 trillion meeting minutes reported in Q3 Fiscal Year 2021 (Mansur & Asmawati, 2021). This current research, mapped using the Publish or Perish application and VOSViewer, indicates that Zoom has become the preferred choice for academics in online learning. This preference is bolstered by Zoom's policy of offering premium services to educational institutions through the "Zoom Education" program, which meets diverse online learning needs (Hastomo & Zulianti, 2022). Zoom provides numerous features such as screen sharing, breakout rooms, live streaming, chat, online subtitles, and whiteboards. It facilitates synchronous communication, enabling real-time interactions where participants can see and hear each other live (Nurieva & Garaeva, 2020). This real-time communication fosters spontaneous interactions without the need for face-to-face meetings, making video conferences a valuable tool in educational technology. Moreover, Zoom's accessibility on both computers and mobile devices allows classes to be conducted via notebooks and smartphones, enhancing user interaction as long as a stable internet connection is available (Singh et al., 2020).

Zoom's features support various educational activities, fostering connectivity among academics. The platform maximizes remote collaboration and resource sharing (Nuryanto, 2021). Teachers can use Zoom for assignment submissions (Aini et al., 2021), sharing class-related information (Cheung, 2021), after-class tutorials (Alfadda & Mahdi, 2021), and supporting language practice (Hastomo, 2021). Zoom enhances synchronous communication interactivity (Chamran et al., 2021) and positively impacts interactive classroom activities and course content (Nuryanto, 2021). However, Zoom requires a stable connection and high device specifications and can lead to interruptions and multitasking challenges if not well-structured (Khusniyah & Khusniyah, 2020).

In this research, Zoom was discussed as a virtual learning medium. Students could complete writing assignments and practice English, benefiting from features like screen sharing and breakout rooms (Raake et al., 2022; Sutiyono & Hastomo, 2022). Teachers can provide real-time assistance, enhancing student engagement on Zoom (Mpungose, 2021). Studies have examined the relationship between video conferencing and student learning outcomes (Nurieva & Garaeva, 2020; Nuryanto, 2021), highlighting Zoom's effectiveness in improving these outcomes. The research suggests new classroom models and distance learning applications that build student confidence in using English skills through synchronous learning.

Academic engagement encompasses motivational, cognitive, and behavioral aspects (Shah & Barkas, 2018). Engagement is multifaceted, involving cognitive, emotional, and behavioral components (Bitrián et al., 2021). Behavioral engagement, essential for participation in school activities, includes engagement in class discussions, attention, persistence, and effort (Istiara et al., 2023). Help-seeking behavior and task persistence are indicators of behavioral engagement, which improves class attendance and participation (Raake et al., 2022). Learning requires the use of strategic skills and effective time management for cognitive engagement. Students use metacognitive techniques to plan, monitor, and evaluate their learning, employing knowledge organization tools and summarization as indicators of cognitive engagement (Hastomo & Septiyana, 2022). Previous research on Zoom's impact on cognitive engagement highlights its benefits over other tools (Maekawa, 2021; Pratiwi, 2022). Studies comparing interactions in video conferencing and online forums show that students prefer online platforms for collaborative learning due to the higher interaction levels required by Zoom (Mpungose, 2021). Given the evolving landscape of online education and the critical role of student engagement, it is urgent to investigate the specific impacts

of Zoom to enhance educational strategies and address existing gaps in empirical research.

Research has extensively investigated the global usage of Zoom among EFL teachers, showing a significant increase. Descriptive studies, such as those by [Aini et al. \(2021\)](#) and [Chamran et al. \(2021\)](#), examined students' motivation, challenges, and perceptions of using Zoom. Quantitative studies by [Alfadda and Mahdi \(2021\)](#) measured students' use of Zoom based on the Technology Acceptance Model (TAM). Case studies by [Cheung \(2021\)](#), [Hastomo \(2021\)](#), and [Maekawa \(2021\)](#) focused on language teaching, using Zoom for EFL, and creating interactive Zoom classes, respectively. Action research by [Hastomo and Zulianti \(2022\)](#) integrated a teaching strategy with Zoom conferencing. Reflective studies include ([Mpungose, 2021](#)), who examined lecturers' use of Zoom for e-learning in South Africa. Despite these studies, a gap remains in comparing the impact of Zoom and LMS on student engagement across cognitive, emotional, and behavioral dimensions. This study addresses this gap with a quasi-experimental design comparing Zoom and Moodle (LMS), providing novel insights into their effectiveness in fostering comprehensive student engagement. This research not only explores the practical applications of Zoom but also offers a comparative analysis highlighting each platform's unique advantages and limitations in education.

Despite its advantages, using Zoom in education presents challenges, such as dependence on intellectual, relational, and temporal dimensions ([Raake et al., 2022](#)). While Zoom fosters collaboration and joy in a relaxed environment, its flexible attendance requirements can also cause burnout and distraction. Technical difficulties like small screens and unstable internet connectivity pose additional challenges ([Suadi, 2021](#)). This study addressed three main issues. First, there is a lack of empirical studies on Zoom's impact on student engagement, highlighting an urgent need for research to fill this gap and provide a clearer understanding of its efficacy and limitations. Second, the sporadic effectiveness of Zoom in fostering engagement and its limitations in achieving learning targets. Third, there is a need for comparative research on Zoom and other LMS. This study aimed to compare the effects of Zoom and LMS (Moodle) on students' online engagement, investigate different communication modes impacting cognitive, emotional, and behavioral engagement, and provide recommendations for optimizing online learning activities through improved student engagement facilitation. Referring to the identified concerns, this study attempts to address a research question of How do Zoom and Moodle (LMS) compare in terms of their effects on students' behavioral, cognitive, and emotional engagement in online learning environments.

Method

The researcher employed a historical cohort control group within a quasi-experimental design in this study. Quasi-experimental studies allow for comparative research in natural settings, which is crucial in educational research, where randomly selecting students is often impractical and unethical ([Ary, 2010](#)). Additionally, quasi-experiments are advantageous because they minimize disruption to school routines and require fewer resources, making them a viable option for using historical cohort control group designs ([Green et al., 2012](#)). This research was conducted over one semester by the same instructor. The instructor compared treatment and control conditions in two classes with identical class activities, learning materials, and syllabi. The experimental group utilized Zoom for teaching and learning activities, while the control group used a LMS for the same activities. Specifically, students in the control group used Moodle as their LMS.

Respondents

The researchers monitored the impact of student's initial knowledge of the material by the researchers monitored the impact of student's initial knowledge by conducting pre-

class assessments to enhance group comparison validity. Twenty students from each group completed the quiz, and the Mann-Whitney U test was used to check for normal distribution and significant deviations. Participants were English education students from one of the private universities in Indonesia during the 2023-2024 academic year. Classes ran for 16 sessions over one semester. The instructor provided material in text, audio, and video formats before classes. The first eight weeks involved material delivery and six online tasks, followed by eight weeks of student-led group presentations. After the course, the researcher recorded online interactions and used content analysis to measure behavioral engagement. Twenty students were interviewed to compare emotional engagement, focusing on their affective responses to interactions, resources, participation, and course content. Additionally, cognitive engagement indicators were explored through these interviews to identify effective learning strategies.

Data collection

The procedures for collecting data and measuring cognitive, emotional, and behavioral engagement during the teaching-learning activities are outlined in Figure 1. It also presents the data measurement and data source of the research.

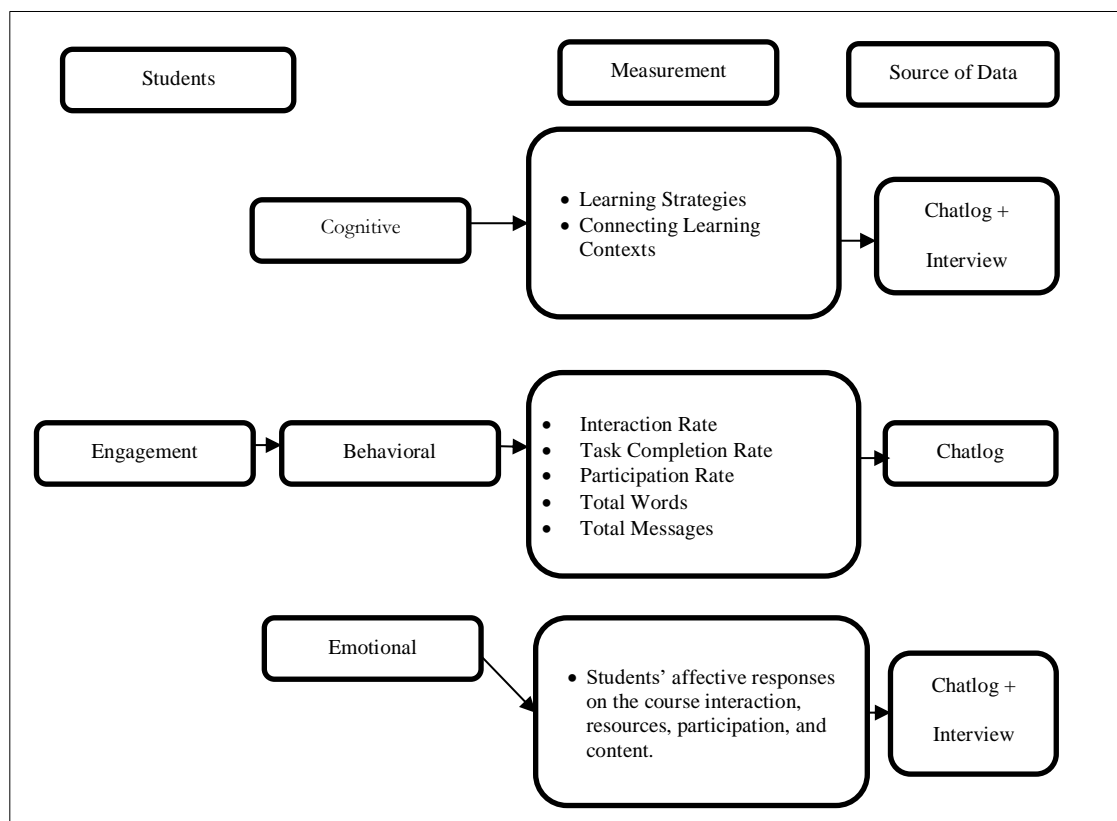


Figure 1. The Data Sources and Measurement of Student Engagement

Steps after the course concluded, researchers collected students' online activity records and employed content analysis to analyze the data. They counted the students' posts and participants, measured the total discussion tasks and individual posts, and classified messages as off-task or on-task. Off-task messages referred to activities unrelated to the learning topic, while on-task messages were directly connected to the issues. On-task messages were further categorized into student interactions (responses or messages) and task completions (responses to finish the task). Sometimes, both interaction and task completion were identified in one message. To compare emotional engagement, researchers interviewed 20 students to understand their affective responses

based on course interaction, resources, and participation. The semi-structured interviews allowed researchers to elaborate and clarify questions for deeper insight. Each interview lasted thirty minutes, with audio recorded, transcribed, and checked for accuracy. Upon course completion, an anonymous Likert-style survey was conducted using Google Forms to investigate students' attitudes based on course satisfaction, student-instructor interaction, and peer interaction. The Mann-Whitney U test was used to compare students' responses, confirming a normal distribution with a significance level of 0.05.

Data analysis

The indicators of cognitive engagement, as highlighted in the interviews, helped students identify perceived learning outcomes and strategies. Researchers used a grounded theory approach (Glaser & Strauss, 2017) to analyze the interviews and classify the primary data. They generated and refined codes through an iterative process until no new codes were identified. The framework of cognitive engagement from (Al-Obaydi et al., 2023) served as guidelines for data interviews. The instrument was adapted to analyze students' on-task messages about the learning contexts. The thematic unit analysis focused on the "communication of meaning" (Peel, 2020), with several analysis units potentially found in one message. The cognitive engagement framework includes four levels: innovation, sense-making, wayfinding, and operation. Researchers identified cognitive engagement indicators using the constant comparison method based on this framework (Chi & Wylie, 2014). They developed ten codes from the data corpus, refining and reviewing them iteratively based on the operationalization of each code. Each code was illustrated with exemplary posts to ensure consistency in analysis. Table 3 presents the final codebook used in this research. Two independent researchers randomly selected and analyzed 20% of the qualitative data to ensure reliability, achieving a 92% agreement rate.

Results

Behavioral engagement

Table 1 summarizes the differences in behavioral engagement between the two classes. Students in the Zoom class produced shorter messages than those in the Moodle class. However, students in the Moodle group wrote fewer messages overall than those in the Zoom class, including both interactive and on-task messages. In the out-of-class discussion, students in the Zoom class produced 474 messages totaling 22,467 words. Of these, 52.8% (176) were interactive messages out of 311 on-task messages. On average, each student in the Zoom class wrote 1123 words, with an average of 47 words per message. In contrast, students in the Moodle class produced 159 messages totaling 17,489 words. Of these, 22.1% (45) were interactive on-task messages. Each student in the Moodle class posted an average of 874 words, with an average of 105 words per message. The analysis also focused on aspects of interaction and participation. The findings revealed that the average participation rate was 86.5% in the Zoom class and 66.5% in the Moodle class, indicating a higher participation rate in the Zoom class.

Table 1. The analysis of cognitive engagement

Aspect	Definition	Example
Operate: Share information	Provide information or opinion	"When the students get bored, I will use another video to play in the class".
Seek information	Propose a question	"There was only the introduction part in the video. Can you guess

Aspect	Definition	Example
		<i>what will be discussed in the next paragraph?"</i>
Wayfinding: Comment without elaboration	Comment on other's ideas without elaboration	<i>"That is a good opinion."</i>
Request elaboration	Request for explanation	<i>"Based on your answer, can you give an example to support your statement?"</i>
Provide elaboration	Add explanation	<i>(After stating an answer). "If the internet connection is poor, the virtual classroom will be trouble". "I disagree with your answer because..."</i>
Summarize	Summarize knowledge with little evaluation	<i>"I could not agree more with your opinion because..."</i>
Sensemaking: Analyze	Analyzing essential features, comparison, and reasons	<i>"The mobility of video conference is a key factor for building a virtual classroom!"</i>
Evaluate	Stating a stance with justification	<i>"That is a good idea! Facilitating the students for writing in the LMS can improve their writing ability".</i>
Innovation Reflect	Reflecting on students' learning outcomes or experience	<i>"I did not prepare all the teaching media, which is my mistake."</i>
Create	Creating new opinions by introducing, understanding, extending, and making suggestions on how e-learning works:	<i>"You can use another educational technology as the teaching media for your virtual classroom and support the teaching-learning activity".</i>

Table 2 indicates the comparison of behavioral engagement. It has 7 categories as the indicators of behavioral engagement. They are the rate of interaction, rate of task completion, participation rate, total word count, total number of messages, number of interaction messages, and number of task messages.

Table 2. Comparisons of behavioral engagement

Indicators	Zoom	Moodle
Total number of enrolled college students	20	20
Number of students who participated in discussions	20	20
Rate of interaction	52.8%	22.1%
Rate of task completion	82.3%	68.5%
Participation rate	86.5%	66.5%
Total word count	22.467	17.489
Total number of messages	474	165
Number of interaction messages	176	45
Number of on-task messages	311	159

According to the results in Table 2, the Zoom class had an 82.3% task completion rate, with an average of 16 students completing the assignments. In contrast, the Moodle class had a 68.5% task completion rate, with an average of 14 students finishing the

assignments. Thus, the task completion rate was higher for students in the Zoom class. Additionally, the interaction rate was 52.8% in the Zoom class compared to 22.1% in the Moodle class. Notably, there were no interactive posts in the Moodle class, whereas the Zoom class demonstrated a significantly better interaction rate.

Emotional engagement

Interviews indicated that Moodle and Zoom could foster connectivity and community in educational settings. Both technologies influenced students' awareness of peer presence. Students in the Zoom class reported positive feelings about their virtual classroom experience. In contrast, the Moodle class did not significantly impact students' emotional engagement.

Several factors contributed to Zoom's ability to enhance emotional engagement. In an academic context, students valued the use of video conferences. One student appreciated the instructor's approachability and the ability to interact in real-time, stating, *"The instructor's effort for being approachable is why we appreciate the instructor. We can interact in real-time, and if there is a problem, we can solve it together."* Observations showed a sense of belonging in the Zoom class, with students using inclusive pronouns like "our," "us," and "we" to refer to the class. Video conferences created an interactive learning environment, with one student noting, *"I want to participate in the discussion because the other students are participating. It is different from Moodle because we seldom read what other students wrote. After posting the message, we will leave, and I do not think other students will read my message in Moodle."*

Emotional expressions, such as emojis, were added to Zoom conversations. A student remarked, *"I want to make friends with students who know how to use stickers because I think they are fascinating people and more likely to be easygoing."* Zoom's social features improved a sense of intimacy, helping students become more friendly and positive through social interactions like holiday greetings. One student said, *"The posts delivered by the other students made us want to know them better."* However, some students preferred the limitations of Zoom features for social interaction. They found using Zoom for academic posts uncommon, and smartphone battery drainage was a drawback. One student expressed reluctance to participate, saying, *"The other students can get a better impression if I do not force myself to participate in the discussions."*

In contrast, students in the Moodle class displayed a neutral attitude toward affective engagement. Responses were succinct, such as *"The impact was not obvious"* or *"I was wondering if there was a strong impact of using this forum."* Two disadvantageous features of Moodle were the pressure of being formal and the lack of interaction. Students were hesitant to give feedback on others' posts, feeling pressured to post in-depth responses. One student mentioned, *"Before posting it on Moodle, I will read several times and double-check the grammar of my essay. The high academic expectations were why I just did that activity."*

Table 3. Survey results of Zoom and Moodle class

Group	M (SD)	Mdn	Mean	Min	Max	Statistical Test Result				
						Mann-Whitney U	Wilcoxon W	Z	Asymp.Sig. (2-tailed)	
Students' peer interaction										
Zoom	20.8 (4.2)	21.3	22.0	7.0	25.0	229.500	439.500	-	0.374	0.890
Moodle	22.0 (3.5)	22.0	25.5	10.0	25.0					
Student-teacher interaction										

Group	M (SD)	Mdn	Mean	Min	Max	Statistical Test Result			
						Mann-Whitney U	Wilcoxon W	Z	Asymp.Sig. (2-tailed)
Students' peer interaction									
Zoom	20.6 (4.2)	20.9	20.6	6.0	25.0	201.500	411.500	-1.502	0.133
Moodle	22.1 (3.5)	22.0	26.5	10.0	25.0				
Course satisfaction									
Zoom	21.0 (4.0)	21.0	20.7	8.0	25.0	201.000	411.000	-1.518	0.129
Moodle	22.3 (3.5)	23.0	26.6	10.0	25.0				
Overall evaluation									
Zoom	62.8 (11.8)	64.0	20.6	21.00	75.0	202.500	412.500	-1.463	0.143
Moodle	66.4 (10.2)	69.0	26.5	30.00	75.0				

Survey results from 20 Moodle students and 20 Zoom students provided insights into course satisfaction and interaction based on student attitudes. Researchers summed the scores of each item in the construct to determine the score for each construct and added these scores to obtain the overall score. Table 3 below presents the students' survey results

Cognitive engagement

To measure cognitive engagement, the students' perceived learning outcomes and learning strategies were identified through interviews and online interaction records. The findings from the students' interaction records are detailed in Table 4. Both technologies support students' cognitive engagement in various ways, but notable differences exist. The wayfinding dimension showed a stark contrast between Zoom and Moodle. Moodle students had the least engagement in wayfinding interactions, while Zoom students had the most. Wayfinding interactions, which involve directional communication, were better facilitated by Zoom. Although both classes engaged in delivering information about specific indicators, the Zoom class demonstrated more cognitively engaging communication.

Comparing groups, the Zoom class showed higher frequencies for all individual indicators of cognitive engagement. Specifically, Zoom students performed better on the "creating" indicator than Moodle students (32 vs. 8). Interviews revealed that they improved their cognitive engagement due to the succinct use of language, connected learning resources, class preparation, and interactivity.

Table 4. Results of cognitive engagement and students' activity

Dimension	Code	Zoom	Moodle
Operation	Disseminating information	82 (23%)	75 (40%)
	Inquiring for information	3 (1%)	0
	Subtotal for information exchange	85 (24%)	75 (40%)
Wayfinding	Commenting without further detail	46 (13%)	4 (2%)
	Asking for further explanation	21 (6%)	8 (5%)
	Giving detailed explanations	32 (9%)	3 (2%)
	Summarizing key points	18 (5%)	6 (3%)
	Subtotal for elaborative interactions	117 (33%)	21 (12%)

Dimension	Code	Zoom	Moodle
Sense-making	Analyzing	17 (5%)	5 (3%)
	Evaluating	34 (10%)	22 (15%)
	Subtotal for critical thinking	51 (15%)	27 (18%)
Innovation	Reflecting	65 (18%)	47 (26%)
	Creating	32 (9%)	8 (4%)
	Subtotal for reflective and creative thinking	97 (27%)	55 (30%)
Overall Total		350 (100%)	178 (100%)

The synchronization and mobility of Zoom allowed students to seize just-in-time opportunities, enhancing interactivity and enabling deeper thinking about discussion topics. One student noted, "My friends in the Zoom class helped me learn writing, and I have more chances to ask and answer questions in this application." This co-production of knowledge in student interactions at the Zoom conference contributed significantly to their cognitive engagement.

The Zoom students utilized course preparation before class began. One student mentioned, "The instructor asked us to prepare for the course because he had already shared the learning material, so we prepared the course content together before class." Zoom enabled direct contact with peers and easy navigation of learning resources, facilitating elaboration and clarification. Another student noted, "It is efficient and convenient for me to ask other students if I want more discussions or am interested in a particular idea." However, they faced challenges due to smartphones' small screens and keyboards, making it hard to use the Zoom app. The chronological display of messages in Zoom's chat feature also made it difficult to follow conversations and engage in in-depth discussions. One student commented, "It is difficult for us to read all the messages if you do not always follow the interactions."

On the other hand, Moodle students found the LMS more suitable for academic discussions due to its asynchronous nature. The extra processing time allowed students to craft their ideas and develop higher-order thinking skills carefully. One student explained, "I could spend days on the essay because I need time to develop my writing, and the asynchronous feature of Moodle could facilitate this purpose." Students used notebooks to access Moodle, appreciating the ease of writing and searching simultaneously, which supported idea development. One student mentioned, "It is nice that we can edit the post on Moodle if we have a new idea or supporting material."

Moodle's threaded format allowed easy organization of posts and supported information retrieval. However, Moodle's formal response requirements and low interactivity were drawbacks. Some students found Moodle not as mobile-friendly as other LMS platforms, facing multiple steps to log in, find the right course, topic, and discussion board, and post their assignments. One student said, "I have difficulty accessing this forum because the user interface is too complex. That is why I did not respond and give feedback to other students' posts." Additionally, long posts were challenging to read and respond to, limiting high-level engagement. Moodle's difficulty of use and low interactivity hindered students' participation in discussions.

Discussion

The researchers in this study analyzed student engagement levels in two different class settings: Moodle and Zoom. The findings revealed that Zoom fostered better behavioral engagement compared to Moodle forums. However, Moodle students wrote longer messages, as seen in the total word count.

The results also indicated no significant difference regarding emotional engagement in course interaction, student-teacher interaction, and student-peer interaction. Zoom facilitated the development of positive interpersonal relationships due to its interactive and friendly environment, whereas Moodle did not significantly affect

students' emotional connections with their classmates or the course. On the downside, Moodle students were unhappy with writing lengthy essays and the limited interaction, while Zoom students were dissatisfied with using Zoom for academic purposes. Despite these issues, both platforms supported students' cognitive engagement. Zoom promoted a higher level of interactive idea exchange, whereas Moodle provided a unique feature for sharing content. Additionally, Zoom allowed for more "creative activities."

Interview results highlighted both the strengths and limitations of each platform. Zoom students appreciated concise language use, connected learning resources, just-in-time learning, better class preparation, and increased interactivity. However, they were troubled by information disorganization and device limitations. Conversely, Moodle students valued the ease of editing, multitasking, extended processing time, and structured discussions, though they were frustrated by the need to respond to and read lengthy posts. Zoom's informal nature and quasi-synchronicity fostered spontaneous discussions and reduced the pressure to be perfect, which enhanced interactivity and intimacy, as supported by previous studies (Nurieva & Garaeva, 2020; Sugianto et al., 2022). Nevertheless, despite Zoom's higher interactivity, the two platforms had no significant difference in emotional engagement. This research was conducted in a blended learning environment, which may have influenced the findings. The results might vary in fully online courses. The course involved online and face-to-face sessions, and the instructor and activities were consistent across both classes, potentially affecting the outcomes. Differences in cognitive engagement were complex. Previous research indicated that Moodle supported higher-order thinking better than traditional media (Octaberlina & Muslimin, 2020), but this study suggested otherwise, aligning with findings from other studies (Rahayu et al., 2022; Rymanova et al., 2015). Moodle's low synchronicity allowed for better processing and understanding of information during discussions, as per media synchronicity theory (Natalia & Julia, 2018). This study's participation in discussions was optional, unlike the mandatory collaborative tasks in other studies. With its high synchronicity, Zoom facilitated idea sharing and interaction, enhancing cognitive engagement. Interaction between social and cultural contexts and individuals also played a crucial role in fostering new ideas (Nuryanto, 2021), suggesting that Zoom could enhance creative thinking.

No single medium is superior, according to media synchronicity theory. The choice of platform should consider group maturity, media features, and task requirements (Suadi, 2021). The researchers recommended that teachers enhance student engagement and learning outcomes using Zoom or Moodle. They suggested using various communicative tools and modes for different learning purposes, clearly communicating the goals and expectations for using these platforms, and involving students in designing educational activities under instructor guidance. This approach could increase emotional and behavioral engagement and focus students more on academic discussions. These findings contribute both theoretically and practically to the field of education. Theoretically, this study enriches the existing literature by comparing Zoom and Moodle in fostering behavioral, cognitive, and emotional student engagement, highlighting the importance of platform selection based on task requirements and student needs. Practically, it offers actionable insights for educators, suggesting the use of a mix of communicative tools, clear goals, and student engagement in designing activities to optimize online learning experiences.

Conclusion

This research examined how Zoom, a video conferencing application, can enhance student engagement. The study focused on the use and impact of Zoom and Moodle on student interaction and engagement. Findings indicated that Zoom significantly fostered the development and interaction of interpersonal relationships among students. Additionally, increased intimacy and interactivity in the learning environment were found

to influence students' psychological motivation. The research also highlighted that Zoom allowed students the flexibility to choose their level and manner of participation in blended learning activities. With more indicators of creativity and idea exchange, Zoom was shown to promote higher levels of cognitive engagement. Furthermore, Zoom proved to be an effective tool for enhancing student engagement within a social context and supporting higher-level thinking through discussions. These results provide evidence to improve the instructional design of Zoom, supporting enriched learning experiences and advancing the theoretical concept of student engagement.

Despite these positive findings, this study has several limitations. First, the sample size was small and limited to students from one private university in Indonesia, which may not represent the broader student population. Second, the study was conducted over a single semester, which might not capture the long-term effects of using video conferencing tools on student engagement. Third, relying on self-reported data through interviews and surveys could introduce biases. Future research should include larger, more diverse samples from different educational institutions and extend over longer periods. Using a mixed-methods approach with objective measures of student engagement, like analytics from LMS and video conferencing platforms, would provide a more comprehensive understanding. Exploring the effects of different features of video conferencing tools on student engagement and integrating AI-driven analytics to personalize learning experiences could also be valuable areas for further study.

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