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Fostering Social Connectedness Through Discussion-Based Pedagogy: Evidence from University Virtual Learning Environments

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Abstract: The increasing prevalence of virtual learning environments has highlighted the importance of fostering students' social connectedness to support meaningful educational experiences. This study examined the relationship between discussion-based pedagogy and university students' social connectedness in virtual learning environments and identified the pedagogical dimensions that contribute most significantly to this outcome. Employing a quantitative cross-sectional survey design, data were collected from 286 undergraduate students enrolled in virtual courses at a public university. A structured questionnaire measuring discussion-based pedagogy and social connectedness was administered, and the data were analyzed using descriptive statistics, simple linear regression, and multiple regression analyses. The findings revealed a significant positive association between discussion-based pedagogy and social connectedness, with discussion-based pedagogy explaining a substantial proportion of the variance in students' social connectedness. Among the pedagogical dimensions examined, peer interaction emerged as the strongest predictor, followed by instructor facilitation, collaborative dialogue, and active participation. In contrast, knowledge sharing did not significantly predict social connectedness when the dimensions were analyzed simultaneously. The findings suggest that discussion-based learning enhances students' social experiences by promoting meaningful interaction, collaboration, and engagement. The study highlights the importance of interaction-rich pedagogical practices in cultivating socially connected virtual learning communities.

Keywords: active participation, collaborative dialogue, discussion-based pedagogy, social connectedness, virtual learning environments

INTRODUCTION

The increasing integration of digital technologies into higher education has transformed the ways students learn, communicate, and engage with academic communities. Virtual learning environments have become a central component of university education, providing flexible access to learning resources and opportunities for interaction beyond the constraints of time and location (Hari Rajan et al., 2025). Despite these advantages,

educators and researchers have increasingly recognized that effective learning in virtual settings extends beyond the delivery of instructional content. Successful online learning also depends on students' ability to establish meaningful social relationships, participate in collaborative activities, and develop a sense of belonging within the learning community (Dulfer et al., 2025). Consequently, fostering social connectedness has emerged as a critical concern in contemporary virtual learning environments.

Social connectedness refers to the degree to which individuals perceive themselves as meaningfully connected to others and integrated within a social network (Marcu et al., 2026). In educational settings, social connectedness is widely recognized as an important factor influencing students' academic engagement, motivation, satisfaction, and overall learning experiences (Allen et al., 2024). Students who experience strong social connections are more likely to participate actively in classroom activities, collaborate effectively with peers, and persist in their studies. In contrast, students who feel socially isolated often report lower levels of engagement, reduced motivation, and diminished satisfaction with their learning experiences. Given the growing prevalence of virtual learning environments in higher education, understanding how social connectedness can be fostered among students has become an increasingly important area of educational research.

A substantial body of literature has emphasized the importance of interaction in promoting effective learning and meaningful educational experiences. Social constructivist perspectives suggest that learning is fundamentally a social process in which knowledge is co-constructed through interaction, dialogue, and collaboration with others (Nithideechaiwarachok et al., 2024). Within virtual learning environments, opportunities for interaction play a particularly important role because students often have fewer informal opportunities to build relationships compared to traditional face-to-face classrooms (Pereira et al., 2023). Consequently, pedagogical approaches that actively encourage communication and collaboration may be essential for strengthening students' sense of social connectedness and creating more engaging learning experiences.

Among various instructional approaches, discussion-based pedagogy has gained considerable attention as a strategy for promoting active participation and collaborative learning. Discussion-based pedagogy emphasizes dialogue, knowledge sharing, critical reflection, and the exchange of perspectives among learners (Radino & Mubarak, 2025). Rather than positioning students as passive recipients of information, this approach encourages them to become active participants in the learning process through questioning, responding, debating, and collaboratively constructing understanding. In virtual learning environments, discussion-based pedagogy can be implemented through various formats, including online discussion forums, synchronous classroom discussions, small-group interactions, peer feedback activities, and collaborative problem-solving tasks (Alkandari, 2024). These activities create opportunities for students to interact regularly with their peers and instructors, potentially fostering stronger interpersonal relationships and a greater sense of belonging within the learning community.

Previous research has consistently demonstrated the educational benefits of discussion-

based pedagogy. Studies have shown that discussion-oriented learning activities can enhance critical thinking, communication skills, learner engagement, and academic achievement (Al Shloul et al., 2024; Aldraiweesh & Alturki, 2023). In online learning contexts, discussion activities have been found to encourage participation, increase interaction among learners, and support collaborative knowledge construction. Furthermore, research on online learning communities suggests that meaningful interaction is closely associated with students' perceptions of community, belonging, and engagement (Currier et al., 2025; Dulfer et al., 2025). These findings indicate that discussion-based pedagogy may play a significant role not only in promoting cognitive outcomes but also in supporting the social dimensions of learning.

Despite the growing body of research on discussion-based learning, important gaps remain in the literature. Existing studies have predominantly focused on cognitive and academic outcomes such as learning achievement, knowledge acquisition, critical thinking development, and engagement (Iyamuremye et al., 2024; Martin et al., 2026). Comparatively less attention has been devoted to examining how discussion-based pedagogy contributes specifically to students' social connectedness in virtual learning environments. While some studies acknowledge the social benefits of collaborative learning and discussion activities, the mechanisms through which discussion-based pedagogical practices foster social connectedness remain insufficiently understood (Delgado et al., 2023; Wheele et al., 2023). Moreover, limited research has systematically investigated which specific aspects of discussion-based pedagogy contribute most significantly to students' sense of social connection and belonging in virtual learning settings (Nyman, 2025).

Addressing this gap is particularly important given the increasing emphasis on student well-being, engagement, and community building in higher education. As universities continue to invest in digital learning initiatives, educators require empirical evidence regarding instructional strategies that effectively support both academic and social outcomes (Alshammari & Alkhwalidi, 2025). Understanding the relationship between discussion-based pedagogy and social connectedness can provide valuable insights for instructors seeking to design learning environments that encourage meaningful interaction and strengthen students' sense of community. Furthermore, identifying the specific pedagogical elements that contribute to social connectedness may help educators optimize discussion-based activities to maximize their effectiveness in virtual settings.

Drawing upon social constructivist perspectives and research on online learning communities, this study investigates the extent to which discussion-based pedagogy fosters university students' social connectedness in virtual learning environments. The study also examines which aspects of discussion-based pedagogy contribute most significantly to students' sense of social connectedness. By focusing on the social outcomes of discussion-based learning, the study seeks to extend current understanding of how pedagogical practices shape students' experiences in virtual learning contexts. Accordingly, this study addresses the following research questions:

1. To what extent does discussion-based pedagogy foster university students' social

connectedness in virtual learning environments?

2. Which aspects of discussion-based pedagogy significantly contribute to students' social connectedness in virtual learning environments?

This study contributes to the literature in several ways. First, it extends existing research on discussion-based pedagogy by shifting attention from predominantly cognitive and academic outcomes to the social dimension of learning, particularly social connectedness. Second, it provides empirical evidence regarding the relationship between discussion-based pedagogical practices and students' sense of social connection within virtual learning environments. Third, by identifying the specific aspects of discussion-based pedagogy that contribute most strongly to social connectedness, the study offers practical guidance for instructors and instructional designers seeking to create more interactive, engaging, and socially supportive online learning experiences. Ultimately, the findings contribute to a deeper understanding of how discussion-based pedagogy can foster stronger learning communities and enhance the quality of students' virtual learning experiences in higher education.

LITERATURE REVIEW

Discussion-Based Pedagogy

Discussion-based pedagogy is an instructional approach that emphasizes dialogue, interaction, and collaborative knowledge construction among learners (Goodyear & Zenios, 2007). Rooted in social constructivist theory, this approach views learning as a socially mediated process in which knowledge is developed through the exchange of ideas, questioning, reflection, and negotiation of meaning. By encouraging active participation and learner-centered engagement, discussion-based pedagogy shifts students from passive recipients of information to active contributors in the learning process (Deng et al., 2025). Within virtual learning environments, discussion-based activities may be implemented through synchronous discussions, online forums, peer feedback sessions, and collaborative tasks that facilitate interaction among learners and instructors (Hari Rajan et al., 2025). Previous studies have shown that discussion-based pedagogy contributes positively to learner engagement, critical thinking, communication skills, and overall learning effectiveness.

In the present study, discussion-based pedagogy is conceptualized as a multidimensional construct comprising five interrelated dimensions: active participation, peer interaction, collaborative dialogue, knowledge sharing, and instructor facilitation. These dimensions were synthesized from recurring pedagogical elements identified across previous literature on discussion-based learning and online collaborative learning (Goodyear & Zenios, 2007; Ouyang & Chang, 2019; Shin et al., 2025), rather than adopted from a single established framework. Although closely related, each dimension represents a distinct aspect of discussion-based pedagogy. Active participation refers to students' behavioural engagement in discussions; peer interaction emphasizes communication and collaboration among learners; collaborative dialogue concerns the co-construction of meaning through reflective exchanges; knowledge sharing focuses on the exchange of

information, experiences, and ideas; and instructor facilitation highlights the instructor's role in guiding, supporting, and sustaining productive discussions. Together, these dimensions capture the essential pedagogical processes through which discussion-based learning operates in virtual learning environments and provide the conceptual basis for measuring discussion-based pedagogy in this study.

Social Connectedness in Virtual Learning Environments

Social connectedness refers to individuals' perceptions of belongingness, interpersonal closeness, and meaningful relationships with others (Miller, 2023). In educational settings, social connectedness reflects students' sense of belonging within the learning community and their perceived connection with peers and instructors (Ebert et al., 2019). Research has consistently demonstrated that social connectedness contributes positively to students' engagement, motivation, academic persistence, well-being, and satisfaction with learning experiences (Farrell et al., 2018; Han, 2021). However, establishing social connectedness in virtual learning environments can be challenging because opportunities for informal interaction are often limited. Consequently, fostering meaningful interaction and a sense of community has become an important objective for educators seeking to enhance students' experiences in online and digitally mediated learning contexts.

Discussion-Based Pedagogy and Social Connectedness

The relationship between discussion-based pedagogy and social connectedness can be explained through social constructivist perspectives that emphasize the importance of interaction in learning and development. Discussion-based learning provides opportunities for students to exchange ideas, collaborate with peers, and engage in meaningful dialogue, thereby facilitating both cognitive and social engagement (Ouyang & Chang, 2019). Previous research has suggested that interactive learning activities contribute to students' sense of belonging, classroom community, and social presence (Wagner et al., 2025). Through active participation and collaborative dialogue, students are able to develop interpersonal relationships and strengthen their connections with the learning community (Fox & O'Maley, 2024). Therefore, discussion-based pedagogy may serve as an important mechanism for fostering social connectedness in virtual learning environments, although further investigation is needed to determine the extent of this relationship and identify the pedagogical aspects that contribute most significantly to connectedness.

Previous Studies and Research Gap

A growing body of research has examined discussion-based pedagogy in higher education and online learning contexts. Previous studies have consistently reported positive effects on learner engagement, participation, critical thinking, communication skills, and academic achievement (Pang, 2022; Weng et al., 2024). These findings demonstrate that discussion-based instructional approaches support a variety of cognitive and behavioral outcomes that contribute to effective learning.

Similarly, research on virtual learning environments has highlighted the importance of interaction and collaboration in fostering students' sense of community and belonging

(DiGiacomo et al., 2023; Reyes et al., 2023). Studies investigating online learning communities have shown that meaningful interaction among learners contributes positively to engagement, satisfaction, and perceptions of social presence (Gao et al., 2024; Lee & Kim, 2023). These findings underscore the importance of creating opportunities for communication and relationship-building within online educational settings.

Despite these advances, several gaps remain in the literature. First, existing studies have predominantly focused on cognitive and academic outcomes of discussion-based pedagogy, including critical thinking, engagement, participation, and achievement. Comparatively less attention has been devoted to examining social connectedness as a primary outcome. Second, while prior research acknowledges the importance of interaction in online learning, relatively few studies have investigated discussion-based pedagogy specifically as a mechanism for fostering social connectedness. Third, limited empirical evidence exists regarding which aspects of discussion-based pedagogy contribute most significantly to students' social connectedness within virtual learning environments.

Addressing these gaps is important because social connectedness has become an increasingly significant indicator of students' educational experiences and well-being in digitally mediated learning environments. Understanding how discussion-based pedagogy contributes to social connectedness can provide valuable guidance for educators seeking to design more engaging, collaborative, and socially supportive virtual learning experiences. Therefore, the present study investigates the extent to which discussion-based pedagogy fosters university students' social connectedness and identifies the pedagogical aspects that contribute most significantly to this outcome.

Conceptual Framework

This study is grounded in social constructivist theory, which emphasizes that learning is fundamentally a social process shaped through interaction, dialogue, and collaborative knowledge construction (Nithideechaiwarachok et al., 2024). According to this perspective, meaningful learning occurs when learners actively engage with others, exchange ideas, negotiate understanding, and participate in shared learning experiences (Smith et al., 2022). Within virtual learning environments, such interactions become particularly important because they provide opportunities for students to establish relationships, develop a sense of belonging, and participate in learning communities despite physical separation.

Discussion-based pedagogy represents an instructional approach that aligns closely with the principles of social constructivism. By encouraging students to engage in dialogue, exchange perspectives, and collaboratively explore course content, discussion-based learning creates opportunities for meaningful interaction among learners and instructors (Shin et al., 2025). Through these interactions, students are able to build social relationships, develop mutual understanding, and strengthen their engagement within the learning environment.

In this study, discussion-based pedagogy is conceptualized as the independent variable, while social connectedness serves as the dependent variable. Social connectedness refers to students' perceived sense of belonging, interpersonal connection, and integration within the virtual learning community (Özdoğan et al., 2025). The proposed framework assumes that greater engagement in discussion-based learning activities provides students with increased opportunities for interaction and collaboration, thereby fostering stronger social connectedness.

Drawing upon social constructivist theory and previous research highlighting the role of interaction in online learning, this study proposes a positive relationship between discussion-based pedagogy and social connectedness. Furthermore, the framework assumes that various aspects of discussion-based pedagogy may contribute differently to students' social connectedness, providing the basis for examining which pedagogical elements exert the strongest influence within virtual learning environments.

METHODS

Research Design

This study employed a quantitative approach using a cross-sectional survey design to examine the relationship between discussion-based pedagogy and university students' social connectedness in virtual learning environments (Slater & Hasson, 2025). A survey design was considered appropriate because it enabled the collection of data regarding students' perceptions of discussion-based learning and their sense of social connectedness (Lim, 2025). Guided by a post-positivist paradigm, the study conceptualized discussion-based pedagogy as the independent variable and social connectedness as the dependent variable. Quantitative analyses were conducted to determine the extent to which discussion-based pedagogy fosters social connectedness and to identify the pedagogical aspects that contribute most significantly to this outcome (Dolnicar et al., 2024). This design aligns with the study's research questions and provides empirical evidence regarding the role of discussion-based pedagogy in fostering social connectedness in virtual learning environments.

Participants

The participants of this study were 286 undergraduate students enrolled in courses delivered through virtual learning environments at a public university. Participants were selected using convenience sampling because the study required respondents who had direct experience with discussion-based learning activities in online courses and were readily accessible during the data collection period (Emerson, 2021). This non-probability sampling approach was considered appropriate for the study's objective of examining the relationship between discussion-based pedagogy and students' social connectedness among individuals who had firsthand exposure to the instructional practices under investigation. To ensure the relevance of the data, only students who had participated in virtual courses incorporating discussion-based instructional practices were invited to complete the survey. Participation was voluntary, and all respondents provided informed consent prior to completing the questionnaire.

Although convenience sampling facilitated efficient access to participants with relevant learning experiences, it may limit the representativeness of the sample and, consequently, the generalizability of the findings beyond the participating institution. Therefore, the results should be interpreted as reflecting the experiences of students within this specific educational context rather than all university students engaged in virtual learning. Future research could enhance external validity by recruiting participants from multiple universities with diverse institutional characteristics and by employing probability-based sampling techniques, such as stratified or cluster sampling, to obtain more representative samples.

Instrumentation

Data were collected using a structured questionnaire consisting of two sections corresponding to the study variables: discussion-based pedagogy and social connectedness. All items were measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The discussion-based pedagogy scale measured students' perceptions of discussion-oriented learning practices in virtual learning environments and comprised five dimensions: active participation, peer interaction, collaborative dialogue, knowledge sharing, and instructor facilitation. Sample items included *"I actively participate in online class discussions," "Online discussions encourage meaningful interaction with my peers,"* and *"The instructor effectively facilitates discussion activities."*

The social connectedness scale measured students' perceptions of belonging and interpersonal connection within virtual learning environments. The instrument included four dimensions: sense of belonging, peer relationships, classroom community, and social engagement. Representative items included *"I feel connected to other students in my online classes," "I feel that I belong to the learning community,"* and *"I have meaningful interactions with my peers during virtual learning activities."*

To establish content validity, the questionnaire was reviewed by three experts in educational technology and online learning, who evaluated the relevance, clarity, and representativeness of the items. A pilot study involving 30 university students was subsequently conducted to assess the clarity and reliability of the instrument. Following the pilot study, the measurement model was evaluated to establish its psychometric properties. Exploratory factor analysis (EFA) confirmed the multidimensional structure of both constructs, with all retained items demonstrating factor loadings above the recommended threshold of 0.50. Subsequently, confirmatory factor analysis (CFA) was performed to verify the measurement model, and all standardized factor loadings exceeded 0.60, indicating satisfactory convergent validity.

The internal consistency and construct reliability of the instrument were further assessed using Cronbach's alpha, Composite Reliability (CR), and Average Variance Extracted (AVE). Cronbach's alpha coefficients and CR values for all constructs exceeded the recommended threshold of 0.70, while AVE values were above 0.50, indicating satisfactory convergent validity. These findings demonstrate that the questionnaire

possesses acceptable reliability and construct validity and is suitable for measuring discussion-based pedagogy and social connectedness in virtual learning environments.

Data Collection

Data were collected over a four-week period during the second semester of the 2025–2026 academic year. The questionnaire was administered online using Google Forms and distributed through university learning management systems and class communication platforms. Prior to completing the survey, participants were provided with information regarding the purpose of the study, the voluntary nature of participation, and the confidentiality of their responses.

Participants who agreed to take part in the study provided informed consent before accessing the questionnaire. To ensure anonymity, no personally identifiable information was collected. Participants were encouraged to respond honestly based on their experiences with discussion-based learning activities in virtual learning environments. Upon the completion of the data collection period, all responses were screened for completeness and prepared for statistical analysis.

Data Analysis

The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 29. Prior to the main analysis, the data were screened for missing values and checked for accuracy and completeness. Descriptive statistics, including means and standard deviations, were computed to provide an overview of students' perceptions of discussion-based pedagogy and social connectedness.

Before conducting the regression analyses, the assumptions underlying linear regression were examined to ensure the appropriateness of the statistical procedures. Normality of residuals was assessed through the inspection of standardized residual histograms and normal probability (P–P) plots. Linearity and homoscedasticity were evaluated using scatterplots of standardized residuals against standardized predicted values. The independence of errors was examined using the Durbin–Watson statistic. For the multiple regression model, multicollinearity among the predictor variables was assessed using tolerance and Variance Inflation Factor (VIF) values. The diagnostic results indicated that all regression assumptions were satisfactorily met, with tolerance values exceeding the recommended threshold of 0.10 and VIF values below the recommended cutoff of 10, indicating no evidence of problematic multicollinearity.

To address the first research question, descriptive statistics and simple linear regression analysis were conducted to examine the extent to which discussion-based pedagogy predicted university students' social connectedness in virtual learning environments. Mean scores were interpreted using predetermined ranges to identify the level of agreement among participants.

To address the second research question, multiple regression analysis was performed to examine the relative contribution of the five dimensions of discussion-based pedagogy (active participation, peer interaction, collaborative dialogue, knowledge sharing, and

instructor facilitation) to students' social connectedness. This analysis enabled the identification of the pedagogical dimensions that significantly predicted social connectedness and the relative strength of their contributions. Statistical significance was determined at the .05 level.

Ethical Considerations

This study adhered to established ethical principles for research involving human participants. Prior to data collection, participants were informed about the purpose of the study, the voluntary nature of their participation, and their right to withdraw from the study at any time without penalty. Informed consent was obtained from all participants before they completed the questionnaire. To protect participants' privacy and confidentiality, no personally identifiable information was collected. All responses were recorded anonymously and used solely for research purposes. The collected data were securely stored and accessed only by the researchers. Furthermore, the findings were reported in aggregate form to ensure that individual participants could not be identified. These measures were implemented to uphold ethical standards and safeguard the rights and well-being of all participants throughout the research process.

FINDINGS

RQ1: To What Extent Does Discussion-Based Pedagogy Foster University Students' Social Connectedness in Virtual Learning Environments?

To address the first research question, descriptive and inferential statistical analyses were conducted to examine students' perceptions of discussion-based pedagogy and social connectedness in virtual learning environments. Descriptive statistics were first used to determine the extent to which students experienced discussion-based pedagogical practices and perceived social connectedness in their online learning experiences. Subsequently, simple linear regression analysis was performed to examine whether discussion-based pedagogy significantly predicted social connectedness. Table 1 presents the descriptive statistics for the dimensions of discussion-based pedagogy.

Table 1. Students' Perceptions of Discussion-Based Pedagogy (N = 286)

Dimension	Mean	SD	Interpretation
Active Participation	4.21	0.58	High
Peer Interaction	4.15	0.62	High
Collaborative Dialogue	4.18	0.60	High
Knowledge Sharing	4.11	0.65	High
Instructor Facilitation	4.25	0.56	High

Overall Discussion-Based Pedagogy	4.18	0.60	High
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As shown in Table 1, students reported a high level of exposure to discussion-based pedagogical practices in virtual learning environments, with an overall mean score of 4.18 (SD = 0.60). Among the dimensions examined, instructor facilitation received the highest rating (M = 4.25, SD = 0.56), indicating that students perceived instructors as actively supporting and guiding discussion activities. Active participation also received a high rating (M = 4.21, SD = 0.58), suggesting that students frequently engaged in discussion activities and contributed to classroom interactions. Similarly, collaborative dialogue (M = 4.18, SD = 0.60), peer interaction (M = 4.15, SD = 0.62), and knowledge sharing (M = 4.11, SD = 0.65) were rated highly by participants. These findings indicate that discussion-based learning activities were consistently implemented across virtual learning environments and provided students with opportunities to interact, exchange ideas, and collaboratively engage with course content. Table 2 presents the descriptive statistics for students' perceptions of social connectedness.

Table 2. Students' Perceptions of Social Connectedness in Virtual Learning Environments (N = 286)

Dimension	Mean	SD	Interpretation
Sense of Belonging	4.12	0.63	High
Peer Relationships	4.08	0.67	High
Classroom Community	4.18	0.61	High
Social Engagement	4.05	0.70	High
Overall Social Connectedness	4.11	0.65	High

The results presented in Table 2 indicate that students experienced a high level of social connectedness in virtual learning environments, with an overall mean score of 4.11 (SD = 0.65). Classroom community recorded the highest mean score (M = 4.18, SD = 0.61), suggesting that students perceived themselves as members of a supportive and collaborative learning community. This finding indicates that virtual learning environments incorporating discussion-based activities were successful in fostering a sense of collective participation and shared learning experiences.

The dimensions of sense of belonging (M = 4.12, SD = 0.63), peer relationships (M = 4.08, SD = 0.67), and social engagement (M = 4.05, SD = 0.70) also received high ratings. These results suggest that students generally felt connected to their peers, valued within the learning environment, and actively engaged in social interactions. Collectively, the findings demonstrate that students experienced strong social connections within discussion-oriented virtual learning settings. To determine the extent to which discussion-

based pedagogy fostered social connectedness, a simple linear regression analysis was conducted. The results are presented in Table 3.

Table 3. Simple Linear Regression Analysis Predicting Social Connectedness

Predictor Variable	β	t	p
Discussion-Based Pedagogy	.72	18.43	< .001

Table 4. Model Statistics

R	R ²	F	p
.72	.52	339.67	< .001

The regression analysis revealed a statistically significant positive relationship between discussion-based pedagogy and social connectedness ($\beta = .72$, $t = 18.43$, $p < .001$). The model explained 52% of the variance in students' social connectedness ($R^2 = .52$), indicating that discussion-based pedagogical practices were substantial predictors of students' perceptions of social connectedness within virtual learning environments. The positive beta coefficient suggests that higher levels of discussion-based pedagogy were associated with stronger social connectedness. Specifically, students who reported greater opportunities for participation, interaction, collaborative dialogue, knowledge sharing, and instructor-supported discussions also reported stronger feelings of belonging, more positive peer relationships, greater classroom community, and higher levels of social engagement.

Overall, the findings provide strong evidence that discussion-based pedagogy plays a significant role in fostering social connectedness among university students in virtual learning environments. The high mean scores across both constructs, combined with the significant predictive relationship identified through regression analysis, indicate that discussion-oriented instructional practices contribute meaningfully to students' social experiences in online learning contexts. These findings suggest that creating opportunities for sustained dialogue and interaction may be an effective strategy for strengthening social connectedness in virtual learning environments.

RQ2: Which Aspects of Discussion-Based Pedagogy Significantly Contribute to Students' Social Connectedness in Virtual Learning Environments?

To address the second research question, a multiple regression analysis was conducted to examine the relative contribution of the five dimensions of discussion-based pedagogy, active participation, peer interaction, collaborative dialogue, knowledge sharing, and instructor facilitation, to students' social connectedness in virtual learning environments. The results are presented in Table 5.

Table 5. Multiple Regression Analysis of Discussion-Based Pedagogy Dimensions Predicting Social Connectedness

Predictor Variable	β	t	p
Active Participation	.12	2.13	.034
Peer Interaction	.31	5.84	< .001
Collaborative Dialogue	.18	3.25	.001
Knowledge Sharing	.09	1.71	.089
Instructor Facilitation	.22	4.18	< .001

Table 6 presents the overall model statistics.

Table 6. Model Statistics for Multiple Regression Analysis

R	R ²	Adjusted R ²	F	p
.79	.62	.61	91.54	< .001

The results of the multiple regression analysis revealed that the overall model was statistically significant ($F = 91.54$, $p < .001$). The five dimensions of discussion-based pedagogy collectively explained 62% of the variance in students' social connectedness ($R^2 = .62$), indicating a substantial predictive effect. This finding suggests that discussion-based pedagogical practices play an important role in shaping students' perceptions of connectedness within virtual learning environments.

Among the predictor variables, peer interaction emerged as the strongest contributor to social connectedness ($\beta = .31$, $t = 5.84$, $p < .001$). This finding indicates that opportunities for students to communicate, collaborate, and engage with their peers significantly enhanced their sense of belonging and interpersonal connection. Students who experienced more frequent and meaningful peer interactions tended to report stronger social connectedness within their virtual learning environments.

Instructor facilitation was identified as the second strongest predictor of social connectedness ($\beta = .22$, $t = 4.18$, $p < .001$). This result suggests that instructors play a critical role in fostering connectedness by encouraging participation, guiding discussions, creating inclusive learning environments, and supporting meaningful interactions among students. Effective facilitation appears to help students feel more engaged and connected to the learning community.

Collaborative dialogue also demonstrated a significant positive contribution to social connectedness ($\beta = .18$, $t = 3.25$, $p = .001$). This finding indicates that discussion activities involving the exchange of perspectives, collaborative problem-solving, and collective meaning-making contribute positively to students' perceptions of connection and community. Through collaborative dialogue, students are able to develop mutual understanding and strengthen their relationships with peers.

Active participation was also found to be a significant predictor of social connectedness ($\beta = .12$, $t = 2.13$, $p = .034$), although its contribution was smaller compared to peer interaction, instructor facilitation, and collaborative dialogue. This result suggests that students who actively contribute to discussions and engage in learning activities are more likely to experience a stronger sense of connection within the virtual learning environment.

In contrast, knowledge sharing did not significantly predict social connectedness ($\beta = .09$, $t = 1.71$, $p = .089$). Although students perceived knowledge sharing as an important component of discussion-based learning, its direct contribution to social connectedness was not statistically significant when the other dimensions were considered simultaneously. This finding suggests that simply exchanging information may be insufficient to foster social connectedness unless accompanied by meaningful interaction, dialogue, and relationship-building opportunities.

Overall, the findings indicate that not all aspects of discussion-based pedagogy contribute equally to social connectedness. Peer interaction emerged as the most influential factor, followed by instructor facilitation and collaborative dialogue. These results suggest that discussion-based learning is most effective in fostering social connectedness when it creates opportunities for meaningful interpersonal interaction, active engagement, and supportive facilitation. Consequently, educators seeking to strengthen students' social connectedness in virtual learning environments should prioritize instructional practices that encourage peer-to-peer communication, collaborative discussion, and active instructor involvement.

DISCUSSION

The present study examined the relationship between discussion-based pedagogy and university students' social connectedness in virtual learning environments. Specifically, the study investigated the extent to which discussion-based pedagogy is associated with social connectedness and identified the aspects of discussion-based pedagogy that contribute most significantly to students' perceptions of connectedness. The findings revealed a significant positive relationship between discussion-based pedagogy and social connectedness, indicating that students who experienced higher levels of discussion-oriented learning also reported stronger feelings of belonging, peer relationships, classroom community, and social engagement. Furthermore, the results demonstrated that peer interaction, instructor facilitation, collaborative dialogue, and active participation significantly contributed to social connectedness, whereas knowledge sharing did not

emerge as a significant predictor when the dimensions were analyzed simultaneously. These findings provide important insights into the social benefits of discussion-based learning within virtual learning environments.

The first major finding of the study indicates that discussion-based pedagogy is positively associated with students' social connectedness. The regression analysis revealed that discussion-based pedagogy explained a substantial proportion of the variance in social connectedness, suggesting that discussion-oriented instructional practices are closely linked to students' social experiences in virtual learning environments. This finding supports the assumptions of social constructivist theory, which emphasizes that learning is inherently social and occurs through interaction, dialogue, and collaborative engagement (Nithideechaiwarachok et al., 2024; Smith et al., 2022). According to this theoretical perspective, meaningful interaction not only facilitates knowledge construction but also strengthens interpersonal relationships and learners' sense of belonging within a community. The high levels of social connectedness reported by participants suggest that discussion-based learning creates opportunities for students to engage with others in meaningful ways, thereby fostering stronger social ties and a greater sense of integration within the virtual classroom.

The findings are consistent with previous studies that have highlighted the importance of interaction in online learning environments. Earlier research has demonstrated that discussion-based activities enhance student engagement, participation, and collaborative learning by encouraging learners to actively exchange ideas and perspectives (Pang, 2022; Weng et al., 2024). Similarly, studies on online learning communities have found that meaningful interaction contributes to stronger perceptions of belonging, social presence, and community (DiGiacomo et al., 2023; Gao et al., 2024; Lee & Kim, 2023). The present study extends these findings by focusing specifically on social connectedness as an outcome of discussion-based pedagogy. While much of the existing literature has concentrated on cognitive outcomes such as critical thinking, engagement, and academic achievement (Al Shloul et al., 2024; Aldraiweesh & Alturki, 2023), the current findings demonstrate that discussion-based learning is also strongly associated with students' social experiences. This contribution is particularly significant given the increasing emphasis on creating supportive and inclusive learning communities within digitally mediated educational environments (Allen et al., 2024; Dulfer et al., 2025).

Another important finding concerns the specific dimensions of discussion-based pedagogy that contribute to social connectedness. Among the dimensions examined, peer interaction emerged as the strongest predictor. This finding suggests that opportunities for students to communicate, collaborate, and interact with one another are fundamental to the development of social connectedness in virtual learning environments. Students who frequently interacted with their peers reported stronger feelings of belonging and

greater integration within the learning community. This result aligns with previous studies emphasizing the central role of peer relationships in online learning. Researchers have consistently argued that peer interaction promotes social presence, trust, mutual support, and community building (Gao et al., 2024; Wagner et al., 2025). The present study reinforces these arguments by demonstrating that peer interaction is the most influential pedagogical factor associated with students' social connectedness. This finding suggests that the quality and frequency of peer-to-peer interactions may be more important for fostering connectedness than merely providing opportunities for information exchange.

Instructor facilitation was identified as the second strongest contributor to social connectedness. This finding underscores the important role instructors play in shaping the social dynamics of virtual learning environments. Effective facilitation involves creating an inclusive learning atmosphere, encouraging participation, guiding discussions, and supporting meaningful interactions among students. When instructors actively facilitate discussions, students may feel more comfortable expressing their ideas, responding to their peers, and engaging in collaborative learning activities. This finding supports previous research indicating that instructor presence is a key factor influencing students' engagement and sense of community in online learning environments (Lee & Kim, 2023; Dulfer et al., 2025). However, the present study extends this understanding by demonstrating that instructor facilitation is also strongly associated with students' perceptions of social connectedness. In virtual settings, where spontaneous face-to-face interactions are often limited, instructors appear to serve as important mediators who foster communication and strengthen interpersonal connections among learners.

The findings also revealed that collaborative dialogue significantly contributes to social connectedness. Collaborative dialogue refers to meaningful exchanges in which students discuss ideas, negotiate understanding, and collectively construct knowledge. This result is consistent with social constructivist theory, which identifies dialogue as a central mechanism through which learning and social relationships develop (Goodyear & Zenios, 2007; Smith et al., 2022). Through collaborative dialogue, students engage with diverse perspectives, build mutual understanding, and establish stronger interpersonal connections. Previous research has similarly reported that collaborative learning activities contribute positively to students' sense of community and belonging (Fox & O'Maley, 2024; Wagner et al., 2025). The present findings suggest that collaborative dialogue is particularly valuable in virtual learning environments because it provides opportunities for deeper interaction that extend beyond superficial communication. As students work together to explore concepts and solve problems, they simultaneously strengthen their social relationships and develop a stronger connection to the learning community.

Active participation was also found to contribute significantly to social connectedness, although its influence was smaller than that of peer interaction, instructor facilitation, and

collaborative dialogue. This finding indicates that students who actively contribute to discussions are more likely to feel connected to their peers and the broader learning community. Active participation increases students' visibility within the classroom and creates opportunities for interaction and engagement. Previous studies have similarly reported positive relationships between participation and students' perceptions of belonging and engagement (Pang, 2022; Currier et al., 2025). The current findings suggest that participation remains an important factor in fostering connectedness; however, its influence appears to depend on the presence of meaningful interactions with peers and instructors. In other words, participation alone may not be sufficient to strengthen social connectedness unless it occurs within a supportive and interactive learning environment.

An interesting finding of the study is that knowledge sharing did not emerge as a significant predictor of social connectedness when the other dimensions were included in the regression model. Although students rated knowledge sharing highly as a component of discussion-based pedagogy, its contribution to social connectedness was not statistically significant. This finding suggests that the exchange of information alone may not necessarily foster meaningful social connections. While knowledge sharing supports learning and facilitates the dissemination of ideas, students may not automatically develop a stronger sense of belonging or interpersonal connection simply by exchanging information. Rather, social connectedness appears to depend more heavily on relational processes such as interaction, dialogue, collaboration, and facilitation (Delgado et al., 2023; Marcu et al., 2026). This finding differs from some previous studies that have emphasized the social value of knowledge exchange. However, it also highlights the possibility that informational interactions become socially meaningful only when they are accompanied by opportunities for genuine engagement and relationship building.

Taken together, the findings suggest that social connectedness in virtual learning environments is influenced not merely by the presence of discussion activities but by the nature of the interactions embedded within those activities. Discussion-based pedagogy appears to be most effective when it promotes meaningful peer interaction, active instructor facilitation, collaborative dialogue, and active student participation. These elements create opportunities for students to build relationships, establish trust, and develop a sense of belonging within the learning community. Consequently, educators should move beyond viewing discussions as tools for content delivery and instead recognize their potential to support the social dimensions of learning.

The study contributes to the existing literature in several ways. First, it extends research on discussion-based pedagogy by shifting attention from predominantly cognitive outcomes to the social dimension of learning, particularly social connectedness. Second, it provides empirical evidence demonstrating a significant positive association between discussion-based pedagogy and social connectedness in virtual learning environments.

Third, it identifies the specific pedagogical dimensions that contribute most strongly to students' perceptions of connectedness, thereby offering a more nuanced understanding of how discussion-based learning supports social outcomes. From a practical perspective, the findings suggest that instructors should intentionally design discussion activities that promote meaningful interaction. For example, structured peer discussion protocols (e.g., think-pair-share, peer feedback, or small-group discussions), collaborative problem-solving tasks, and discussion forums requiring students to respond to and build upon peers' ideas can strengthen social connectedness. Instructors should also employ facilitative questioning techniques, provide timely feedback, and encourage inclusive participation to create a supportive online learning community. Such practices may help cultivate stronger learning communities and enhance students' social experiences in virtual learning environments (Allen et al., 2024; Dulfer et al., 2025).

CONCLUSION

This study investigated the relationship between discussion-based pedagogy and university students' social connectedness in virtual learning environments. The findings revealed a significant positive association between discussion-based pedagogy and social connectedness, indicating that students who experienced higher levels of discussion-oriented learning also reported stronger feelings of belonging, peer relationships, classroom community, and social engagement. The results further demonstrated that peer interaction emerged as the strongest contributor to social connectedness, followed by instructor facilitation, collaborative dialogue, and active participation, while knowledge sharing did not significantly predict social connectedness when the other dimensions were considered simultaneously. These findings suggest that discussion-based learning contributes to students' social experiences primarily through meaningful interaction, collaboration, and engagement rather than through information exchange alone.

The study contributes to the growing literature on virtual learning by highlighting social connectedness as an important outcome of discussion-based pedagogy. The findings suggest that educators should intentionally design discussion activities that encourage peer interaction, collaborative dialogue, active participation, and effective instructor facilitation to strengthen students' sense of belonging and community in virtual learning environments. Nevertheless, the study is limited by its cross-sectional survey design and reliance on self-reported data from a single institutional context. Future research may employ longitudinal, experimental, or mixed-methods approaches to further examine the relationship between discussion-based pedagogy and social connectedness across diverse educational settings. Overall, the study underscores the importance of interaction-rich pedagogical practices in cultivating socially connected and supportive virtual learning communities.

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