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Examining Collaborative Learning and Involvement as Influential Factors on Students' Learning Performance

Naheed Haq, phd scholar at Lincoln college university Malaysia & lecturer institute of Management Sciences Peshawar Pakistan
Naheed.haq@imsciences.edu.pk
Dr. Uranus Sadat
Professor Lincoln college university Malaysia

Abstract:

Higher education institutions are increasingly embracing active learning classrooms as a means of encouraging student participation and engagement in the educational experience. The study aimed to explore the connection between social factors and students' academic performance, as well as how these social elements can facilitate collaborative learning and engagement. The study employed the constructivism theory to observe students' learning habits, and data were collected through surveys administered to university students. Social variables have a positive and significant impact on active cooperative learning and student engagement, according to structural equation modeling (SEM) research. These social characteristics included interaction with classmates and teachers, social presence, and social media use. In turn, these factors positively affected students' performance in the classroom. The findings further supported the use of two-way mediation in this study. It was found that collaborative learning, coupled with interactions with social elements, significantly enhanced student learning activities. As a result, it is advised that online learning be promoted in order to facilitate students' academic advancement inside higher education institutions. The study emphasizes the importance of creating a supportive social environment that fosters collaborative learning and active involvement, resulting in improved academic accomplishment for students.

Key words: collaborative learning, examining, influential factors, classroom, students' involvement, social elements

Introduction

Modern educational institutions are consistently incorporating state-of-the-art technologies to improve their approaches to teaching and learning. . In the present era, social networking websites (SNS) have evolved into digital learning platforms that promote collaborative learning and the exchange of information (Rau et al., 2008). These resources support students in cultivating more robust social connections, as well as nurturing communication and fostering creativity (Kabilan et al., 2010). Collaborative learning has grown in popularity in recent years, as indicated by studies by Lin et al. (2010) and Moon et al. (2011). According to a 2005 study by Huang, Yoder, and Hochevar, this educational strategy is valued for its ability to stimulate learning motivation, improve attitudes towards active learning, and eventually raise overall academic accomplishment. In higher education, the adoption and promotion of active learning have been employed to improve learning outcomes (Ogawa & Shimizu, 2015). Traditional classrooms are gradually giving way to student-centered active learning environments (Lee et al., 2018), aligning with the broader educational trend of engaging students more actively in their studies (Brooks, 2011).Graham et al. (2007) highlight that active learning involves teachers consciously and intentionally encouraging student participation in lessons. Among the various active learning techniques, collaborative learning has proven to be particularly successful, as noted by Prince (2004). Teachers frequently employ collaborative learning to hasten student learning and improve academic success. It helps pupils develop their critical thinking abilities (Garrison et al., 2001). Within an interactive learning setting, students actively participate in discussions, observe and evaluate each other's work, exchange ideas, and collectively make group decisions, thereby acting as valuable resources for each other's learning (Strebe, 2018). Sims (2003) argues that interaction among students not only motivates them to study but also keeps them attentive, engaged, and committed to sharing ideas with one another. Several investigations have analyzed how the use of social networks affects privacy, health,

culture, society and collaborative learning (Al-Rahmi et al., 2020; Lee et al., 2013; Mohamed & Ahmad, 2012; Oh et al., 2013). However, due to issues such as cyberbullying and cyberbullying, the use of social media can have a negative impact on students' open learning and academic success (Al-Rahmi et al., 2018; Al-Rahmi et al. ., 2019; Alotaibi, 2019; Waters et al., 2020).

Despite these reservations, there has been a noticeable scarcity of research examining the effectiveness of social media as a Tool for educational collaboration in the context of higher education and its impact on student outcomes. In order to close this research gap, the current study will look into the aspects of active collaborative learning that inspire students and influence the efficiency of their learning. This research is particularly crucial as the quality of education in emerging nations like Pakistan is declining, and it is essential to adopt innovative educational systems to improve the standard of instruction (Raza, Qazi, Umer, et al., 2020). In the current educational system, students rarely get the opportunity to actively participate in class activities, hindering their development as thoughtful and reflective learners. To address this, a shift towards collaborative learning strategies is necessary in educational institutions that still rely on traditional teaching methods. This approach aims to stimulate interest, encourage active involvement, boost learning performance, and motivate students in their learning journey (Qureshi et al., 2021).

In order to better understand how social elements, such as student engagement techniques and collaborative learning, affect students' learning performance, this study's main objective is to examine these social factors. A conceptual model was created and put to the test in a real study involving undergraduate university students cooperating over the course of a semester. Al-Rahmi et al. (2018) discovered that collaborative learning through social media has a favorable impact on students' academic achievement and satisfaction, even though prior research (Molinillo et al., 2018) examined the role of social factors in web-based collaborative learning environments. This research provides significant contributions to our current understanding of the dynamics of teaching and learning It advances our understanding of how social factors including communication, social presence, and social media use influence collaborative learning and student engagement, eventually leading to better educational outcomes. These findings are consistent with prior studies that emphasized the relevance of these elements in improving learning outcomes (Akyildiz & Argan, 2012; Nemetz et al., 2012).

Furthermore, by investigating how social determinants influence collaboration on online social platforms and underscoring the relative significance of these elements within a comprehensive framework, the study addresses a gap in existing literature (Manca & Ranieri, 2016). Secondly, this study stands out for its examination of double mediation, investigating how engagement and collaborative learning together impact students' learning performance, a dimension that has not been explored in previous research.Thirdly, by collecting data from a sample of college students in Pakistani higher education institutions, the study provides valuable insights into how social factors may influence students' academic performance within this specific context. Fourthly, the study adopts the constructivism theory, which has not been extensively investigated in the Pakistani setting, to evaluate students' learning effectiveness. Lastly, this study centers on the enhancement of students' learning performance through collaborative learning, addressing the rise in online education adoption and contributing to the literature in this specific domain.

Literature Review

Theoretical foundation

The theory of constructivist learning

Presently the prevailing pedagogical theory, constructivism significantly shapes the methods of learning and instruction. At its heart, constructivism posits that authentic learning transpires when individuals actively strive to grasp their surrounding environment. In simpler terms, they formulate explanations for the "how" and "why" of phenomena by assimilating novel information and experiences to enrich their existing mental frameworks (Snowman et al., 2000). The theories of Piaget and Vygotsky serve as the foundation for constructivist educational approaches and practices (Tzuo, 2007). When using these techniques, the student assumes the role of an information architect and actively engages in the learning process. Constructivist ideas serve as the cornerstone of these dynamic learning approaches (Erbil, 2020). Bruner (1966), who clarified the ideas of creative learning and constructivism, is generally credited with developing the idea of constructivism. Additionally, Piaget and Inhelder (1969) contributed to constructivist ideas by outlining numerous ways in which students can integrate their knowledge. The constructivism hypothesis investigates the effects of cooperation and involvement on learning outcomes and provides as a framework for evaluating students' academic performance. According to the constructivist approach (Al-Rahmi et al., 2019), collaborative learning fosters teachers and students working together to create constructive contributions, leading to significant improvements in peer interaction and learning. The major purpose of the study was to evaluate student learning performance through the lens of constructivism theory, with a focus on the aspects that influence collaborative learning in order to improve undergraduate students' overall academic achievements. The research model was built on the fundamental concepts of constructivist philosophy.

Development of Hypothesis

Participating in collaborative learning and interacting with peers.

The benefit of social interaction, which is increasingly recognized to be crucial for academic success (Siau et al., 2006), serves as the cornerstone of active learning. During interaction, people communicate with each other in both directions. According to Vuopala et al. (2016), different interactions, including those between students, are necessary for successful collaborative learning. Peer contact has been shown to dramatically increase students' interest and zeal, spurring them to investigate a variety of topics and eventually enhancing their academic achievement (Kuo et al., 2014). The impacts of interaction, intragroup emotional support, and online collaboration technologies on customer-supported online learning were studied by Hernández-Sellas et al. in 2019. They discovered a statistically significant link between group collaboration and student interactions. Students believe they learn better when they participate in genuine collaborative settings than when they study alone. According to Chan et al. (2019), interaction strengthens collaborative learning, which improves learner performance. Additionally, Shapiro et al. (2017) note that peer contact motivates students to discuss and exchange knowledge, which promotes active involvement. Therefore, peer interaction is closely linked to students' engaged collaborative learning, implying the following positive outcomes.

H1: The dynamics of active collaborative learning are greatly influenced by peer contact.

Interaction between students and teachers, as well as dynamic collaborative learning

Many studies have been conducted to study the impact of interactivity on participation of students in collaborative learning in action, as demonstrated by McDonough and Foote's 2015 research. For pupils to learn successfully, interaction with professors is essential (Fu et al., 2009). Such interactions further heighten and stimulate students' enthusiasm for collaborative learning, providing them with greater opportunities to participate in class discussions. Moreover, timely feedback from instructors promotes performance enhancement. The success of students' academic careers is significantly influenced by two-way communication between students and teachers, claim Ahmad et al. (2017). A high association has been shown between interaction, collaborative learning, and learning outcomes, claim Chan et al. (2019). Another advantage of interactive learning is the ability for teachers to respond to student comments during lessons, fostering student engagement, collaboration, and active participation. Therefore, we suggest the following:

H2: In shaping the dynamics of active collaborative learning, instructors play a significant role through their interactions.

The product of active collaborative learning combined with social presence.

Social presence played a crucial role in collaborative learning by influencing interpersonal relationships (Kozan & Richardson, 2014). Fu et al. (2009) point out that a student's greater social presence within a collaborative work group not only increases his motivation to study, but also increases his willingness to invest more effort in the learning process. As a result of the sense of belonging that social presence fosters, students are more likely to participate in cooperative learning with their peers, which improves the quality of their overall education (Smith & Flaherty, 2013).Numerous research, including Lee (2014), have repeatedly shown that social presence has a positive impact on learning outcomes. Cho et al. (2015) found that greater social engagement is associated with higher levels of active learning, while Molinello et al. (2018) established a relationship between social presence and active learning in their research. Moreover, the degree of social presence and collaborative learning can influence students' preferred learning styles and overall happiness, as indicated by Chen et al. (2018). In conclusion, social interaction emerges as a key factor in promoting active learning, as it fosters engagement, motivation, and collaborative learning among students (Prince, 2004). On the basis of the debate above, we offered the following idea:

H3: Active collaborative learning is greatly influenced by social presence.

Integrate social networks into interactive collaborative learning experiences.

Students and communities utilize social media to share knowledge and information. According to Venkatesh et al. (2003), the use of social media for interactive and collaborative learning is a critical component influencing the development of technology usage models. According to research conducted by Al-Rahmi and Zaki in 2017, students show more respect for collaborative learning through social media, and this is attributed to better academic success. In addition, Li et al. (2012) found that students' attention levels increased after participating in collaborative learning activities on social media (Rohrbeck et al., 2003). As stated by Sarwar et al (2019), social media functions as a dynamic tool that accelerates the creation of learning environments by encouraging student participation and communication. This leads to improvements in both behaviour and academic performance. As a powerful educational tool, social media continues to improve and evolve educational settings. As a result, the following theory has been put forth:

H4: The usage of social media has a substantial impact on collaborative learning in action.

Participation in cooperative learning and engagement of students.

According to Bonwell and Eison (1991), activities that require students to act and be conscious of their actions are included in active learning. As per Hamouda and Tarlochan (2015), active learning requires students to do more than passively read and listen. It involves taking part in events that promote real-world experience, such as presentations and conversations. The generative theory of learning, as out by Prince (2004), contends that active cognitive processes help pupils learn more successfully. Gainor et al. (2014) claim that by fostering a competitive learning environment, active learning raises student engagement, encourages improved classroom behavior, promotes students' commitment to their studies and higher education institutions, and finally lowers dropout rates. Additionally, Al-Rahmi et al. (2015) discovered a connection between students' motivation in their study and active learning. According to McDonough and Foote (2015), active collaborative learning promotes students to actively engage in the learning process. Students engage in collaborative learning, working together at varying performance levels to create a cooperative and active learning environment. Therefore, we present the hypothesis:

H5: Active collaborative learning exerts a substantial influence on student Involvement.

Engagement of students and academic performance.

Involvement has a significant role in determining the progress of children's learning and academic achievement. Students' interest in a subject is influenced by their interactions with classmates and professors during the learning process (Anderson, 2003). Actively participating in their work, students become higly motivated and connected to the subject matter, particularly when collaborative work is facilitated through computer-based tools (Sims, 2003). Engaging in collaborative activities allows students to exchange ideas, understand different perspectives, and enhance their learning experience (Barron, 2003). The effectiveness of students' learning is also influenced by their cognitive processes and their capacity to engage with the material (Mayer et al., 2009). Active collaborative learning not only provides useful resources, but it also increases students' involvement with the subject, creating a conducive environment for knowledge transfer (Baird & Fisher, 2005). Ahlfeldt et al. (2005) emphasize that student engagement not only enhances the quality of the learning environment but also positively impacts their performance. Based on the previous discussion, we propose the following hypothesis:

H6: The level of student participation is critical in determining the efficacy of learning outcomes.

Active collaborative learning acts as a link in the learning process.

According to Blasco-Arcas et al. (2013), student-teacher interaction is thought to promote student performance in both collaborative and traditional learning situations. Active participation is emphasized in collaborative learning, encouraging students to read, listen, write and reflect on the contributions of their group. This heightened level of involvement leads to increased attention spans and commitment levels among students. Active collaborative learning is successful when there is interaction, social media use, and social presence. These elements also have a good impact on student learning outcomes. In higher education, the adoption of collaborative learning methods is apparent, as it sparks student engagement and active involvement, leading to positive effects on their problem-solving skills, critical thinking abilities, interpersonal relationships, and persistence, as indicated by Prokess and McDaniel in 2011. Increasing students' overall learning outcomes and experiences is proven to be a successful strategy when active engagement and collaborative learning are combined. Consequently, we suggest the following:

H7: Active collaborative learning plays a pivotal role in bridging the connection among several social factors, including peer interaction, student-instructor engagement, social presence, and the utilization of social media, with respect to students' engagement level.

Student engagement in the role of a mediator

Involvement is a multidimensional psychological construct that includes commitment, absorption, and enthusiasm in students' participation, as outlined by Schaufeli et al. in 2002. The interaction between the individual and their environment influences students' perceptions and levels of engagement, which in turn impact both their social and academic development. According to Guthrie et al. (2000), the impact of instructional adjustments on students' performance and accomplishments is moderated by their level of participation. Engagement becomes an important aspect in explaining student accomplishment since it is crucial in determining how effectively children learn when they are engaged in the appropriate cognitive processes (Mayer et al., 2009). Elevated levels of engagement are a robust indicator of student success and exceptional test results. According to Barron (2003), successful collaboration requires the interchange of ideas, sharing, and a complete grasp of other views. Learner engagement acts as a mediator between students' perceptions of certain teachers and their academic progress, as indicated by Chen and Ko's research in 2019.Therefore, we present the hypothesis:

H8: Student engagement acts as a mediator linking social factors, dynamic collaborative learning, and academic performance.

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Methodology

Research model

Figure 1 depicts the conceptual framework that encompasses numerous aspects of social interactions. These form the independent variables in the model and include interactions with peers and instructors. Social presence and social media use were integrated into the model as mediating factors. The dependent variables are student participation and active collaborative learning. The primary objective of the model is to scrutinize the manner in which social factors impact students' academic accomplishments, with collaborative learning and engagement serving as intermediary factors. The central focus of the framework is the exploration of the relationships among these variables. The conceptual framework, shown in Figure 1, includes a variety of independent social interaction variables. These include things like peer connections, teacher interactions, social presence, and social media participation. Student involvement and active collaborative learning are intervening variables in the model, while learning performance is the main dependent variable. The aim of the approach is to examine the influence of social variables on student learning outcomes, with particular attention to the mediating influence of collaborative learning and interaction. The following operational definitions have been given to these variables for the purposes of clarity and accurate assessment:

Collaborative learning: This pertains to the context in which learners engage in shared tasks, leveraging each other's resources and skills.

Social presence: This indicates the psychological perception of a learner's connectedness with their peers, impacting their engagement.

Student engagement: This is the perception that students form as a result of their interactions with peers and teachers while they are studying.

Effective learning is facilitated by encouraging peer interaction through participation, conversations, and peer teaching. This encourages active engagement with the course materials. Teachers can interact with students to offer comments, respond to their inquiries, and build deeper relationships.

The use of online tools that enable the creation and dissemination of written, visual, and audio information is referred to as social media usage. The improvement of a person's capacity for engaging in a specific behavior is included in learning performance.

Data collection and research tools

With the exception of social presence, which was rated on a seven-point Likert scale, the remaining characteristics were rated on a five-point scale ranging from “strongly disagree” to “strongly agree.” This study used a quantitative approach, where data was collected using a questionnaire. The survey contained a series of closed-ended questions designed to explore interaction characteristics and collect demographic information to analyze the characteristics of the selected sample. In total, the questionnaire consisted of 34 items, corresponding to the seven variables under study.

The survey was conducted online and was distributed to 400 students at the Institute of Management Sciences (IMSciences) in Peshawar, utilizing a convenience sampling approach. A total of 398 questionnaires were successfully completed by students from diverse fields at IMSciences in Peshawar.

The study comprises a sample size of 398. This exceeds the benchmark sample size of 300 or more, as stipulated by Raza, Khan, Rafi, and Javaid (2020), Raza et al. (2019), and Comrey and Lee (1992).

This study's survey questions were modified from previous scholarly research. The outcomes of two separate research projects are used to address the issues of peer contact and active collaborative learning.

So and Brush's (2008) work influenced the development of two items related to active collaborative learning and three items related to peer interaction.

The final two components, active collaborative learning and peer interaction, were directly incorporated from the studies conducted by Sarwar et al. (2019) and Al-Rahmi and Othman (2013), respectively.

In addition, three variables pertaining to student participation and one item pertaining to social media usage were taken straight from Al-Rahmi and Othman's (2013) study. Furthermore, a 2019 study by Sarwar et al. revealed three parameters connected to social media use.

Based on a study conducted by Abrantes et al. in 2007, questions about student-teacher interactions and academic performance were developed to assess both of these characteristics. Four variables linked to student-instructor interaction and four measures related to academic success were changed in the context of this study. Adaptations to the social presence questions were made in light of the 2018 study by Molinillo et al. In this respect, four elements altogether were changed. It is essential to emphasize that the data obtained for this research are solely intended for the purpose of completing the study, and participants' self-esteem will not be adversely affected by their participation.

Statistical technique

For this study, demographic information was summarized using descriptive statistical methods, primarily frequencies, using the Statistical Package for the Social Sciences (IBM SPSS 22) (Qureshi et al., 2021). To study the path model in depth, the analysis uses partial least squares structural equation modeling (SEM-PLS) through the SMART PLS 3.2.3 program, taking into account factors such as reliability, convergent validity, and discriminant validity. Furthermore, the study used a bootstrap approach, following the recommendations of Hair et al. (2017).

Analysis

Table 1

Respondent's Demographics

	Demographic items	Frequency	Percentile Age
Age	18–21	157	39.4
	22-25	208	52.3
	26-29	28	7.0
	29 above	5	1.3
Gender	Male	254	63.8
	Female	144	36.1
Qualification	Undergraduate	279	70.1
	Graduate	77	19.3
	Postgraduate	42	11.0

Table 1 distribution of respondents by age, gender, and educational attainment. 398 people made up the overall participant pool. Of that number, 39.4% were between the ages of 18 and 21 and 52.3% were between 22 and 25. The remaining 1.3% were older than 29, and 7.0% were between the ages of 26 and 29. Out of the 398 respondents, 63.8% identified as male, and 36.1% as female. The respondent group included 70.1% undergraduates, 19.3% graduate students, 11.0% postgraduates.

Measurement model

Survey data were assessed using Smart PLS 3.2.3 software, following the guidelines of Ringle et al. (2015). The proposed measurement and structural models were formulated based on the exploratory model (PLS-SEM) recommended by Hair et al. (2017). To examine validity and reliability, the characteristics proposed by Hair et al. in 2011 and 2012 were used. The assessments for convergent and discriminant validity are critical components of the measuring model. Often, concepts like construct

reliability and validity are used to describe convergent validity. Cronbach's alpha, composite reliability, and average variance extracted (AVE), are presented in Table 2. Following that, convergent validity, cross-loadings, Average Variance Extracted (AVE), and Heterotrait-Monotrait analyses were carried out.

Table 2

Cronbach's alpha, composite reliability, and average variance extracted

	Items	Loadings	Cronbach's alpha	Composite reliability	Mean-variance extracted (AVE)
Interactive collaborative learning	ACL1	0.821	0.833	0.887	0.661
	ACL2	0.792			
	ACL3	0.823			
	ACL4	0.815			
Engagement with fellow students.	IWP1	0.735	0.846	0.899	0.622
	WP2	0.837			
	IWP3	0.788			
	IWP4	0.789			
	IWP5	0.793			
Involvement of students	SE1	0.702	0.777	0.897	0.813
	SE2	0.84			
	SE3	0.796			
	SE4	0.895			
	SE5	0.914			
Interaction between students and instructors	S11	0.87	0.836	0.886	0.667
	S12	0.847			
	S13	0.828			
	S14	0.789			
Students' academic achievement	SLP1	0.810	0.785	0.905	0.824
	SLP2	0.820			
	SLP3	0.901			
	SlP4	0.902	0.819	0.893	0.735
Utilization of social media	SMU1	0.894			
	SMU2	0.835			
	SMU3	0.836			
Online presence in a social context	SP1	0.857	0.830	0.894	0.673
	SP2	0.817			
	SP3	0.848			
	SP4	0.761			

The methods used to evaluate discriminant validity adhered to the paradigm established by Fornell and Larcker in 1981. All values in Table 3 that are greater than those outside the diagonal support the establishment of discriminant validity. It can be seen in Table 4, that each indicator variable exhibits a more pronounced loading on the related latent variable, highlighting the indicator variable's remarkable degree of pertinence to that particular hidden variable. The information in Table 5 consistently resides at 0.85 or lower, in agreement with Qazi et al. (2020) and Gold et al. (2001). This result indicates that discriminant validity for the HTMT ratio has been successfully attained.

Structural model

Within the framework of partial least squares structural equation modeling (PLS-SEM), the route coefficient, designated as a standardized regression coefficient (beta), is critical in appraising the structural model and hypotheses. A relationship is deemed significant by the path coefficient criterion when its p-value is less than 0.01.

Table 3

Distinctiveness validity

	ACL	IWP	SE	SII	SLP	SMU	SP
ACL	0.817						
IWP	0.690	0.788					
SE	0.655	0.627	0.904				
SII	0.664	0646	0.539	0.815			
SLP	0.638	0.576	0.660	0.510	0.908		
SMU	0.619	0.582	0.500	0.517	0.450	0.857	
SP	0.658	0.662	0.588	0.693	0.530	0.563	0.822

Note: ACL (Active Collaborative Learning), IWP (Interaction with Peers), SE (Student Engagement), SII (Student-Instructor Interaction), SLP (Student Learning Performance), SMU (Social Media Use), and SP (Social Presence).

Table 4

Cross-loadings analysis.

	ACL	IWP	SE	SII	SLP	SMU	SP
ACL1	0.821	0578	0.534	0.559	0.461	0.593	0.569
ACL2	0.797	0.548	0.444	0.535	0.531	0.464	0.501
ACL3	0.827	0.618	0.604	0.535	0.512	0.495	0.552
ACL4	0.817	0.518	0.544	0.555	0.571	0.475	0.534
IWP1	0.527	0.738	0.464	0.475	0.492	0.395	0.515
IWP2	0.561	0.838	0.535	0.545	0.472	0.436	0.545
IWP3	0.546	0.788	0.536	0.481	0.392	0.506	0.515
IWP4	0.558	0.788	0.455	0.485	0.412	0.476	0.535
IWP5	0.527	0.792	0.485	0.556	0.492	0.487	0.535
SE1	0.331	0.323	0.703	0.317	0.453	0.497	0.235
SE2	0.351	0.301	0.885	0.238	0.663	0.427	0.145
SE3	0.486	0.464	0.793	0.479	0.564	0.497	0.285
SE4	0.584	0.564	0.895	0.480	0.545	0.487	0.536
SE5	0.597	0.572	0.915	0.481	0.646	0.427	0.526
SII1	0.547	0.533	0.445	0.813	0.456	0.447	0.556
SII2	0.548	0.532	0.435	0.848	0.416	0.448	0.566
SII3	0.548	0.558	0.445	0.823	0.396	0.407	0.596
SII4	0.527	0.487	0.435	0.784	0.396	0.367	0.546

SLP1	0.338	0.455	0.475	0.244	0.816	0.307	0.370
SLP2	0.239	0.312	0.445	0.274	0.825	0.327	0.256
SLP3	0.588	0.547	0.596	0.474	0.906	0.393	0.451
SLP4	0.579	0.506	0.607	0.454	0.906	0.413	0.453
SMU1	0.560	0.505	0.487	0.474	0.376	0.893	0.556
SMU2	0.520	0.544	0.397	0.444	0.436	0.823	0.556
SMU3	0.490	0.443	0.407	0.404	0.336	0.833	0.398
SP1	0.573	0.592	0.537	0.564	0.446	0.484	0.855
SP2	0.542	0.541	0.497	0.574	0.466	0.434	0.817
SP3	0.521	0.572	0.477	0.564	0.436	0.474	0.847
SP4	0.512	0.462	0.427	0.564	0.406	0.464	0.761

Note: ACL (Active Collaborative Learning), IWP (Interaction with Peers), SE (Student Engagement), SII (Student-Instructor Interaction), SLP (Student Learning Performance), SMU (Social Media Use), and SP (Social Presence).

Table 5

Heterotrait–monotrait ratio (HTMT).

	ACL	IWP	SE	SII	SLP	SMU
SP						
ACL						
IWP	0.819					
SE	0.809	0.774				
SII	0.797	0.770	0.671			
SLP	0.789	0.706	0.842	0.630		
SMU	0.745	0.699	0.628	0.625	0.559	
SP	0.785	0.784	0.727	0.830	0.652	0.677

Note: ACL (Active Collaborative Learning), IWP (Interaction with Peers), SE (Student Engagement), SII (Student-Instructor Interaction), SLP (Student Learning Performance), SMU (Social Media Use), and SP (Social Presence).

Table 6

Path Analysis Findings.

Hypothesis	Regression	Effect type	SRW
H_1	IWP –> ACL	DE	0.286***
H_2	SII –> ACL	DE	0.241***
H_3	SP –> ACL	DE	0.173***
H_4	SMU –> ACL	DE	0.231***
H_5	ACL –> SE	DE	0.653***
H_6	SE –> SLP	DE	0.664***

Note: ACL (Active Collaborative Learning), IWP (Interaction with Peers), SE (Student Engagement), SII (Student-Instructor Interaction), SLP (Student Learning Performance), SMU (Social Media Use), and SP (Social Presence), SRW (Standardized Regression Weights), DE (Direct Effect)

*** Denotes significance at 1%.

Table 7

Findings from the Mediation Analysis.

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Hypothesis	Regression path	Effect type	SRW
H_{7a}	IWP –> ACL –> SE	IE	0.188***
H_{7b}	SII –> ACL –> SE	IE	0.157***
H_{7c}	SMU –> ACL –> SE	IE	0.151***
H_{7d}	SP –> ACL –> SE	IE	0.114***
H_{8a}	IWP –> ACL –> SE –> SLP	IE	0.124***
H_{8b}	SII –> ACL –> SE –> SLP	IE	0.104***
H_{8c}	SP –> ACL –> SE –> SLP	IE	0.100***
H_{8d}	SMU –> ACL –> SE –> SLP	IE	0.075***

Note: ACL (Active Collaborative Learning), IWP (Interaction with Peers), SE (Student Engagement), SII (Student-Instructor Interaction), SLP (Student Learning Performance), SMU (Social Media Use), and SP (Social Presence), SRW (Standardized Regression Weights), IE (Indirect effect).

*** Indicates significance at the 1% level.

This study confirms hypotheses H1, H2, H3, H4, H5 and H6. Table 7 explores the indirect effects of different social factors on student participation and highlights the role of active collaborative learning as a partial mediator in this context. All social elements consistently show a favorable and statistically significant impact on active collaborative learning, as shown in Table 6, with p-values constantly below 0. In a nutshell, students' overall levels of engagement are significantly raised when they actively engage in collaborative learning, experience social presence, communicate with classmates and teachers, and use social media. As a result, hypothesis H7 is confirmed. The study also explored how student participation had a moderating influence. The results show a strong correlation between rising levels of active collaborative learning and predictors including social presence, instructor involvement, peer interaction, and social media use. As a result, this enhanced active collaborative learning promotes more student engagement, which in turn leads to better learning outcomes for students. According to the study, students who actively engage in conversations are more likely to work together on projects, which fosters improved performance in the classroom.

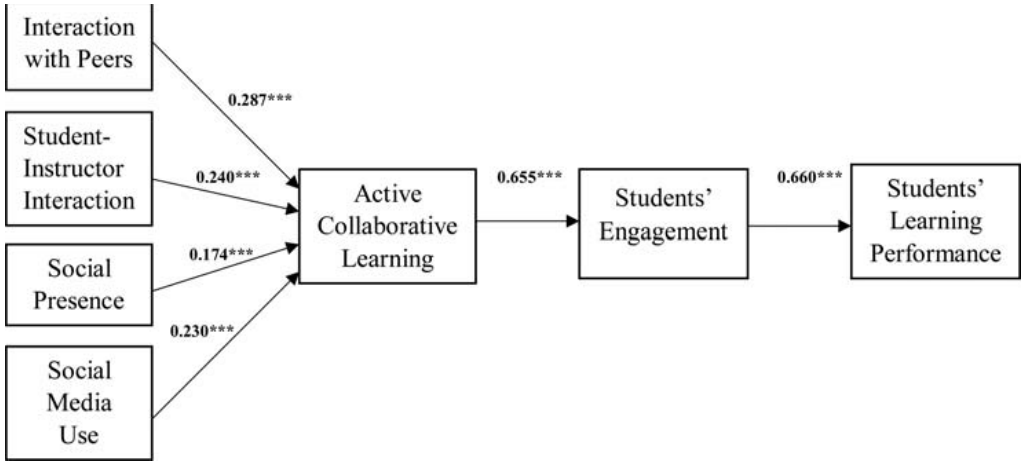

Figure 1. Study's conceptual model. Source: authors' development.

Discussion

As was already noted, the presented hypotheses were validated using the SEM analysis. The data show substantial support for both the suggested model and the hypotheses, revealing light on the variable's complicated linkages. The six fundamental constructs' associated hypotheses, all of which were supported by empirical data, are represented graphically in Figure 2. The central hypothesis revolves around the connection between peer involvement and active collaborative learning. Peer participation and collaborative learning have a substantial and favourable link, according to the results (r = 0.287, p 0.01). According to this result, collaborative learning promotes peer involvement, which leads to more student group discussions and information sharing. These data support the hypothesis that student cooperation and active learning encourage enhanced interaction, as found by Chan et al. (2019). According to earlier study (Lee et al., 2011; Robinson, 2013), the encouragement of peer involvement and the exchange of ideas by collaborative learning also fosters a sense of belonging. Students are motivated to maintain high levels of engagement throughout their educational experience by feeling like they belong.

The next hypothesis focuses on how students connect with teachers while actively participating in collaborative learning. According to the findings, students place a high importance on interactions with their teachers and show a clear preference for active learning techniques. As a result, the results show a strong and favourable connection (r = 0.240, p 0.01) between instructor interactions and active collaborative learning. This underscores the significance of promoting and enabling interactions between students and teachers to enhance the effectiveness of active collaborative learning. These findings are congruent with the findings of Ahmad et al. (2017), who emphasized the importance of two-way communication between students and instructors in increasing students' academic learning. Additionally, Chan et al. (2019) assert that teacher-student interactions that are engaging encourage active participation in class discussions. Instructors must work with students and provide essential support in order to achieve effective active learning (Niemi, 2012). Teachers are essential in creating a collaborative atmosphere, improving instructional strategies, and encouraging optimistic attitudes (Niemi & Nevgi, 2014).

Another area of research examines the correlation between social presence and proactive collaborative learning. The results indicate a noticeable and favorable association between social presence and engaged collaborative learning (r = 0.174, p < 0.01). The research highlights the connection between greater social presence in the group and greater student involvement in active learning. Previous studies support the idea that social presence plays a key role in encouraging students to actively participate in learning activities (Cho et al., 2015). These findings are congruent with those of Fu et al.'s 2009 study, which looked at the influence of students' social presence within a workgroup on their motivation to learn and exert effort. Furthermore, they are similar with the findings of Smith and Flaherty's 2013 study, which emphasized how social presence works as an incentive for students, motivating them to improve their learning through collaboration. The fourth hypothesis investigates the connection between social media and group collaboration. The results demonstrate a substantial and positive link (correlation coefficient of r = 0.230, p 0.01) between social media use and active cooperation. This shows that social media enhances cooperation, which in turn improves overall performance. These findings are congruent with the findings of Sarwar and colleagues' 2019 study, which indicated that adding social media into the classroom promotes student cooperation and active involvement. The sixth hypothesis investigates the connection between active collaborative learning and student participation. According to the study, active engagement in collaborative learning increases students' access to resources and information, which enhances their learning outcomes. The results demonstrate a substantial and positive relationship (r = 0.655, p 0.01) between student involvement and active collaborative learning. According to Gaynor et al. incorporating different media not only increases student interest, but also encourages greater participation.

Mediation analysis

By acting as intermediaries between these factors, the study investigates the interaction between active collaborative learning and student involvement. According to research by Benbunan-Fich and Hiltz in 2003, Chan et al. in 2019, and Mu and Ribera in 2016, peer contact, interactions with instructors, social media usage, social presence, and student involvement all have an impact on active collaborative learning. A crucial instructional method that drives student motivation for proactive participation and cooperation and thus boosts levels of engagement is collaborative learning. Furthermore, the findings of Chan and Ko's (2019) study support the notion that student involvement acts as a mediator in the relationship between the factors. These data support the occurrence of a dual mediation effect, which was the study's main aim. Finally, active collaborative learning and student participation appear as critical aspects impacting educational results.

Conclusion

The purpose of this study was to investigate the effects of social interaction, social media use, and social presence on collaborative learning to improve both student engagement and academic performance. The research effectively corroborates all relationships outlined in the model. As a result, it offers valuable insights into the educational attainment of university students, as well as their interactions with peers, instructors, and others within public domains. This study illuminates the roles played by social presence, social media engagement, overall engagement, and collaborative learning within the academic context. The findings underscore the advantages of collaborative learning within the peer group, as it cultivates favorable student outcomes. Collaborating in a group learning environment empowers students to cultivate robust ideas and perspectives through group deliberations and interactions with classmates and teachers. This collaborative approach not only enriches the learning journey but also contributes to students' scholastic accomplishments. Additionally, this data shows a strong and significant correlation between active collaborative learning and student engagement. Collaborative learning allows students to gain access to a plethora of information and resources, which improves their academic achievement. These findings support the use of constructivist theory in this study, which looks at the dynamics of collaboration and participation. The findings confirm that participation in group activities, along with an evaluation of social aspects, enhances learning results.

The research provides new perspectives on the relationships between engagement, social presence, active collaborative learning, and social media use. The study investigates how social factors affect students' learning results using a dual mediation technique in which engagement and collaborative learning serve as mediators. The study emphasizes the value of encouraging students to actively participate in their education through collaborative learning as a significant tactic for improving their future employability. The study's conclusions reinforce the validity of the model and demonstrate the predictive power of social factors in actively shaping collaborative learning. The outcomes of the study imply that online learning platforms that encourage group discussions increase student engagement and participation. This study contributes to the current body of information in this domain by presenting a constructivism-based model that elucidates how social elements such as engagement and collaborative learning influence academic success in Pakistani institutions. The study also investigates the use of social media for group projects and student involvement in Pakistani higher education institutions.

Managerial implications

The paper makes a number of suggestions for academic institutions. First and foremost, educational institutions ought to actively encourage and assist teachers in incorporating collaborative learning strategies into their instructional strategies and academic courses. This approach has the potential to significantly enhance student engagement and overall academic performance.

Despite its advantages, collaborative learning remains relatively underutilized in higher education. Therefore, institutions should facilitate and support the transition of professors from conventional teaching methods to online learning platforms, where social media can play a pivotal role in fostering

student connections. Leveraging social media allows students to effortlessly connect and engage with peers, which can have a positive impact on their academic performance. Teachers should advise students on how to use social media for group projects since it creates an environment that is very conducive to learning. Through group conversations about tasks, this tactic encourages student engagement and involvement. This and previous studies (Janssen et al., 2010; McCarthy, 2010) show that students who engage in collaborative and collaborative learning through social media see improvements in their academic performance. By utilizing social media, students can effortlessly engage in collaboration with both their peers and instructors, facilitating the sharing of knowledge and concepts that enrich the learning experience. Moreover, educators should ensure students have easy access to learning materials.

By tapping into the social aspects that influence academic development, educators can effectively engage students and elevate their academic performance. Universities play a pivotal role in advancing active learning by incorporating social elements and exploring innovative opportunities for undergraduates to enrich their learning journey.The importance of communication and interaction among group members during learning activities cannot be overstated, as it cultivates a sense of community and mutual support. To enhance students' learning outcomes and overall efficiency, academic institutions should promote collaborative learning approaches for projects. This strategy allows students to interact with their peers as well as their teachers, facilitating the sharing of knowledge and the production of ideas and therefore improving the overall immersive learning experience.

Constraints and Suggestions for Future Research

There are some reservations about the study that should be considered. First of all, it's crucial to acknowledge that the replies came from a cross-sectional survey analysis, necessitating caution when trying to draw conclusions about basic linkages. To address this limitation and bolster the model's credibility, future research endeavors should involve longitudinal studies, encompassing methods like surveys and observations. This approach would provide a more comprehensive and accurate perspective. It's also important to note that the results are particular to Karachi, Pakistan, where the current study was carried out. Therefore, to enhance the applicability of the conclusions, subsequent research should encompass sample populations from diverse countries and regions, enabling the findings to be more widely generalizable. The study's narrow emphasis on just four social characteristics that affect active collaborative learning is the third restriction. Future research projects may include additional variables to achieve a more complete understanding of the topic. A more comprehensive examination could benefit from considering factors such as the instructor's social presence, varying degrees of student participation, or the utilization of learning outcomes as dependent variables.

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