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Review Article

Challenges and Solutions in Implementing Social Media Strategies for College Library Users in Goa

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A B S T R A C T

This study explores the impact of social media strategies on collaborative learning and learner performance within college libraries in Goa. Through a survey of 98 respondents, it investigates how perceived enjoyment, ease of use, and usefulness of social media tools contribute to enhanced student engagement and academic success. Utilising SPSS and Smart PLS for analysis, the findings reveal significant relationships between social media usage and improved collaborative learning experiences, alongside challenges such as maintaining an engaging online presence and ensuring accessibility. The research underscores the importance of tailoring social media content to meet diverse user needs and highlights the necessity for libraries to adopt user-centred approaches in their digital outreach efforts. These insights offer valuable implications for college libraries seeking to leverage social media for educational enhancement.

Keywords: Social Media Strategies, Collaborative Learning, Learner Performance, College Libraries

Introdution

In the contemporary educational landscape, college libraries have evolved into crucial centres that serve not only as repositories for academic resources but also as platforms for community engagement and learning. The integration of social media strategies within college libraries presents a unique set of challenges and solutions, highlighting the dynamic interaction between digital communication and educational services. This paper aims to examine these challenges and solutions by synthesising a range of literature, offering a comprehensive understanding of how social media can be strategically utilised within the library context. The rapid advancement of the fourth industrial revolution has emphasised the significance of digital literacy and adaptability within higher education institutions.[1] Social media platforms, with their far-reaching and interactive capabilities, provide libraries with opportunities to engage with students in innovative and meaningful ways. However, the application of these strategies comes with certain complexities. Educational institutions must navigate challenges such as varying levels of student engagement, diverse technological competencies, and the ever-evolving nature of social media. As noted by Chowdhury (2024),[2] while social media can enhance academic performance and engagement, it also brings inherent risks that require careful management. To successfully implement social media

strategies, libraries must first gain a deep understanding of their users' specific needs and preferences. This understanding can be achieved through continuous assessment and adaptation, as emphasized by Baudin and Mapulanga (2023),[3] who stress the importance of qualitative evaluations in shaping effective and supportive practices. Soliciting regular feedback from users enables libraries to customise their social media initiatives, fostering greater interaction and resource utilisation, ultimately improving the academic experience.

In recent years, the role of libraries as centres for social innovation has gained increasing recognition.[4] Through the effective use of social media, libraries can promote collaborative initiatives, support research projects, and facilitate knowledge-sharing among diverse stakeholders. This aligns with the global shift towards enhancing the impact of libraries through innovative practices.[5] For instance, the strategic deployment of social media can help libraries create virtual communities, extending their reach beyond physical limitations and fostering inclusive learning environments. However, a significant challenge in implementing social media strategies lies in balancing the varied needs of users while maintaining a cohesive digital identity. As pointed out by Cushing and Osti (2023),[6] the increasing incorporation of artificial intelligence (AI) into digital archives requires a sophisticated understanding of how such tools can improve user experience without undermining the library's core values. Striking this balance is crucial, as libraries aim to provide equitable access to information while protecting user privacy and data security.

The COVID-19 pandemic has further accelerated the transition towards blended learning environments, prompting libraries to reassess and adapt their service delivery models.[7] In this new educational context, social media has emerged as a vital communication tool, allowing libraries to disseminate information efficiently and effectively. However, as noted by Ceschi et al. (2021),[8] promoting lifelong learning and enhancing the competencies of library staff in social media literacy are crucial factors in successfully navigating these changes. By offering continuous professional development opportunities, libraries can empower their staff to create engaging content and manage online interactions with greater proficiency.

Effectively addressing the challenges associated with implementing social media strategies in college libraries requires a collaborative approach that engages multiple stakeholders, including library staff, students, and faculty members. By fostering a culture of open communication and cooperation, libraries can develop more effective strategies that resonate with their diverse user populations. This collaborative approach is further reinforced by the research of Altınkaya Genel et al. (2024),[9] who advocate for evidence-based practices that align the spatial supply of resources with the demands of users in educational settings.

Literature Review

This literature review explores the integration of social media strategies within college libraries, underscoring both the challenges and solutions identified in recent research. College libraries, as essential resources in higher education, are increasingly utilising social media platforms such as Facebook, Twitter, Instagram, and TikTok to foster student engagement and support educational goals.[10] Social media offers libraries a unique opportunity to connect with students in real time, providing a platform for information sharing, program announcements, and educational outreach. However, the effectiveness of these efforts hinges on understanding user behaviour, curating relevant content, and maintaining a dynamic online presence.[11]

A central challenge highlighted in the literature is the need for libraries to address disciplinary differences in information literacy. Dreisiebner and Schlögl (2019)[12] emphasise that academic disciplines vary widely in their approaches to digital resources, requiring libraries to create social media strategies tailored to these disciplinary nuances. For instance, humanities PhD students engage with social media and digital resources differently than their peers in the sciences.[13] Such differences demand a tailored approach, allowing libraries to maximise engagement by customising their social media content for diverse academic groups. This user-centred approach is further supported by Gorichanaz et al. (2020),[14] who advocate for a sociocultural perspective when designing digital strategies. By understanding how social media fits into students' daily lives, libraries can create more empathetic and relevant engagement approaches, considering users' varied backgrounds and preferences.

The COVID-19 pandemic further underscored the importance of social media as libraries shifted their services to digital platforms. In South Africa, for example, many academic libraries in Gauteng adapted quickly, using social media to maintain communication with students and faculty when physical spaces were inaccessible.[11] This pivot to digital communication highlights libraries' need for adaptability in an era where in-person interactions can be limited. Similarly, Rizvi and Nabi (2021)[15] point to the challenges libraries faced during the transition from physical to virtual learning spaces. While social media facilitated continuous engagement, libraries also encountered issues surrounding digital equity, as not all users had equal access to technology or the internet. As college libraries continue to refine their social media strategies, they must account for such access disparities to ensure inclusive and effective outreach. These studies collectively underscore the importance of an adaptable, user-centred, and discipline-sensitive approach

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in leveraging social media to enhance library services and student engagement in higher education.

Crafting engaging content that resonates with students poses a significant challenge for college libraries, particularly in the context of social media strategies. The literature emphasises that successful engagement hinges on the creation of relevant, timely, and interactive content that not only informs but also encourages user participation[16]. This necessitates a delicate balance between providing valuable information and fostering a sense of community among users. As Gohil and Thakker (2021)[17] suggest, integrating emerging technologies, such as blockchain, can enhance content authenticity and reliability, which is crucial in an era where misinformation is prevalent. By ensuring that the information shared is credible and trustworthy, libraries can build a stronger connection with their audience and promote active engagement.

To support collaborative learning (CL), libraries can leverage social media to create platforms for interaction among students and faculty. This may include discussion forums, webinars, or live Q&A sessions that promote dialogue around academic topics. By facilitating these interactions, libraries can foster an environment where students feel encouraged to collaborate and share knowledge. Research has shown that collaborative learning enhances student engagement and performance, creating a more enriching educational experience.[18] Moreover, libraries can use social media to highlight group projects and collaborative research, further reinforcing the importance of teamwork in academic settings. By showcasing success stories and student achievements, libraries can inspire others to participate in collaborative efforts.

The importance of learner performance (LP) is another crucial aspect that social media strategies can positively impact. Effective social media use can directly influence students' academic success by providing them with resources that enhance their learning. Libraries can utilise social media platforms to share study materials, library tutorials, and research guides, thereby improving students' access to vital academic resources. Furthermore, by offering personalised support and feedback through social media, libraries can assist students in their learning journey, ultimately boosting learner performance. When students perceive that they have access to resources and support through social media, they are more likely to engage actively with their studies.

Perceived enjoyment (PE) is a critical factor in the successful implementation of social media strategies in libraries. If students enjoy their interactions on social media, they are more likely to engage with library content and participate in community events. To enhance perceived enjoyment, libraries can create entertaining and visually appealing content, such as infographics, videos, and interactive polls. Engaging content not only attracts users but also encourages them to share information with their peers, further expanding the library's reach. Social media campaigns that incorporate gamification elements, such as contests or challenges, can also enhance enjoyment, making the library experience more interactive and fun. By fostering a positive emotional connection with users, libraries can strengthen their community ties and increase overall engagement.

The perceived ease of use (PEU) of social media platforms is another vital aspect that affects how students interact with libraries online. If students find social media channels intuitive and user-friendly, they are more likely to utilise these resources regularly. Libraries must ensure that their social media platforms are well-organised and easy to navigate. This can involve simplifying content delivery and offering clear guidelines on how to access various resources. Additionally, libraries should provide training for staff to ensure they are proficient in utilising social media tools effectively. K. K. and Maskari (2019)[19] emphasise that engaging students through blended learning requires faculty and staff to be knowledgeable about both traditional and digital pedagogies. This training can empower library personnel to enhance user experiences on social media, making it easier for students to engage with library services.

Perceived usefulness (PU) plays a significant role in how students view the library's social media efforts. If students find that the information shared on social media enhances their learning experience and meets their academic needs, they are more likely to perceive these platforms as valuable resources. Libraries should consistently highlight the benefits of their social media presence, such as access to exclusive resources, event notifications, and real-time communication with library staff. By emphasising the utility of these platforms, libraries can cultivate a sense of loyalty among students, encouraging them to engage more frequently with social media content. Furthermore, integrating analytics tools can help libraries assess user engagement and content effectiveness, enabling them to refine their social media strategies based on user feedback and preferences.[20]

Lastly, social media use (SMU) serves as a crucial indicator of how effectively libraries engage with their audiences. The literature highlights the importance of maintaining a consistent online presence to encourage ongoing interactions with users. However, managing multiple platforms requires adequate staffing and resources, which can be a challenge for libraries with limited personnel and budgets.[21] Libraries must prioritise developing a robust social media management strategy that encompasses staffing, content creation, and audience engagement. Establishing a clear social media policy can help streamline

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efforts and ensure that messaging remains consistent and aligned with institutional goals.[22]

As libraries continue to explore the potential of social media, it is essential to evaluate the effectiveness of their strategies continuously. Utilising analytics tools to monitor engagement metrics such as likes, shares, and comments can provide valuable insights into user behaviour and preferences. Regular assessments enable libraries to identify successful strategies while also pinpointing areas for improvement. Additionally, soliciting feedback from users through surveys or focus groups can enhance the relevance and effectiveness of social media initiatives, as users share their experiences and suggestions for improvement.[18,23]

In conclusion, the integration of social media strategies within college libraries presents a multifaceted approach to enhancing student engagement and academic success. By addressing the various dimensions of collaborative learning, learner performance, perceived enjoyment, perceived ease of use, perceived usefulness, and social media use, libraries can create an inclusive and interactive environment that meets the diverse needs of their users. The proactive implementation of these strategies, combined with continuous evaluation and adaptation, can significantly impact the academic community and the overall educational experience.[24,25]

Research Methodology

This study aims to explore the impact of social media strategies on enhancing student engagement and academic performance in college libraries. Specifically, the research focuses on key dimensions such as collaborative learning (CL), learner performance (LP), perceived enjoyment (PE), perceived ease of use (PEU), perceived usefulness (PU), and social media use (SMU). The research adopts a quantitative methodology, employing both SPSS and Smart PLS for comprehensive data analysis.[26-28]

A structured survey was designed to capture students' perceptions and experiences related to social media use in college libraries. The survey consists of various items measuring the five primary constructs: collaborative learning, learner performance, perceived enjoyment, perceived ease of use, and perceived usefulness. The questionnaire was distributed online to ensure wide accessibility and convenience for respondents. A total of 98 valid responses were collected from college students in Goa, forming a robust dataset for statistical analysis.[29-31]

Objectives

The objectives of this study are as follows:

- To assess the influence of social media strategies on collaborative learning among college students in Goa.[32]
- To evaluate the impact of social media use on learner performance in academic settings.[33]
- To analyse the relationship between perceived enjoyment and student engagement with library social media content.[34]
- To investigate the role of perceived ease of use and perceived usefulness in shaping students' attitudes towards using social media platforms for academic purposes.[35]
- To explore how social media use affects overall student engagement and satisfaction with library resources.[36]

Hypotheses

The following hypotheses were developed based on the study objectives:

- **H1:** Social media strategies positively influence collaborative learning among college students in Goa.
- **H2:** There is a significant positive relationship between social media use and learner performance in academic settings.
- **H3:** Perceived enjoyment has a positive impact on student engagement with library social media content.
- **H4:** Perceived ease of use significantly affects students' attitudes towards using social media platforms for academic purposes.
- **H5:** Perceived usefulness positively influences students' willingness to adopt social media for educational purposes.
- **H6:** Increased social media use contributes to higher levels of student engagement and satisfaction with library resources.

Data for this study were gathered using an online survey. The structured questionnaire was designed to capture the relevant information on students' experiences, perceptions, and behaviors related to social media use in academic contexts. The survey was distributed online, providing respondents with a convenient and accessible means of participation. A total of 98 valid responses were collected from students across various colleges in Goa.[37-39]

The collected data will be analyzed using two primary statistical tools: SPSS and Smart PLS.

SPSS (Statistical Package for the Social Sciences) will be employed for:

- Descriptive statistics to summarize the characteristics of the data.
- Reliability analysis to ensure the consistency of the survey instruments (Cronbach's alpha).
- Preliminary correlation tests to examine the relationships between the key variables.[40,41]

Smart PLS (Partial Least Squares Structural Equation Modeling) will be used to:

- Conduct structural equation modeling (SEM) to evaluate the relationships between latent variables and test the formulated hypotheses.

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- Assess the strength and significance of the relationships between the constructs and examine the overall model fit.

The analysis is aimed at providing insights into the effectiveness of social media strategies in enhancing student engagement and academic performance within college libraries. The results will help to understand how social media use influences student behavior, attitudes, and perceptions, and provide recommendations for the optimization of library services using digital communication strategies.[42,43]

Analysis

In this study, a total of 98 respondents from Goa were analyzed to understand the demographic characteristics relevant to the impact of social media strategies employed by college libraries on collaborative learning and learner performance. The age distribution of the respondents varied, with 30% of participants aged 18-24, 45% between 25-34 years, 20% in the 35-44 age bracket, and 5% aged 45 and above, indicating a predominance of young adults, which is expected in a college setting. Regarding gender, the sample was relatively balanced, with 52% of respondents identifying as female and 48% as male, highlighting a diverse representation in the study. The marital status of the participants revealed that 70% were single, while 30% were married, suggesting that the majority of respondents were in a phase of life typically associated with higher education pursuits.

The educational background of the respondents showed that 60% had completed their undergraduate degree, 25% held a postgraduate degree, and 15% were currently pursuing their education. This distribution indicates a highly educated sample, likely to benefit from and engage with social media strategies in academic settings. In terms of occupation, 35% of respondents were students, 25% were employed in the private sector, 20% were self-employed, and 20% were engaged in government services. This variety in occupational backgrounds provides insight into the diverse experiences and perspectives of respondents concerning social media usage in educational contexts. Finally, the income levels of participants varied, with 30% earning less than Rs. 20,000 per month, 40% earning between Rs. 20,000 and Rs. 40,000, 20% earning between Rs. 40,000 and Rs. 60,000, and 10% earning more than Rs. 60,000. This income distribution reflects a mix of socio-economic backgrounds among respondents, which may influence their access to and engagement with social media resources provided by college libraries. Overall, this demographic analysis provides a comprehensive overview of the sample, allowing for a nuanced understanding of how these factors may affect perceptions and experiences related to social media strategies in educational environments.

Table 1.Factor Analysis

	CL	LP	PE	PEU	PU	SMU
CL1	0.911					
CL2	0.879					
CL3	0.901					
LP1		0.921				
LP2		0.916				
LP3		0.852				
PE1			0.949			
PE2			0.878			
PE3			0.887			
PEU1				0.883		
PEU2				0.882		
PEU3				0.924		
PU1					0.812	
PU2					0.831	
PU3					0.88	
SMU1						0.893
SMU2						0.84
SMU3						0.912

Note: CL= Collaborative Learning, LP= Lerner Performance, PE= Perceived Enjoyment, PEU= Perceived Ease of Use, PU= Perceived Usefulness, SMU= Social Media Use

Table 1 presents the results of a factor analysis conducted using Smart PLS to assess the factor loadings across six latent constructs: Collaborative Learning (CL), Learner Performance (LP), Perceived Enjoyment (PE), Perceived Ease of Use (PEU), Perceived Usefulness (PU), and Social Media Use (SMU). Factor loadings represent the correlations between observed variables (items) and their respective latent constructs, indicating the extent to which each item aligns with its designated factor. High factor loadings, generally above 0.7, suggest strong association with the intended construct, confirming the validity of the measurement model.

For the Collaborative Learning (CL) construct, three items (CL1, CL2, and CL3) exhibit high factor loadings of 0.911, 0.879, and 0.901, respectively, indicating robust correlations with this construct and supporting its measurement reliability. Similarly, the Learner Performance (LP) construct is represented by three items (LP1, LP2, and LP3), with factor loadings of 0.921, 0.916, and 0.852, further validating this construct's coherence. The Perceived Enjoyment (PE) construct also demonstrates strong internal consistency, with three items (PE1, PE2, PE3) loading at 0.949, 0.878, and 0.887, respectively. For Perceived Ease of Use (PEU), items PEU1, PEU2, and PEU3 load at 0.883, 0.882, and

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0.924, indicating solid construct representation. Perceived Usefulness (PU) is supported by loadings of 0.812, 0.831, and 0.88 for items PU1, PU2, and PU3, respectively. Lastly, Social Media Use (SMU) exhibits strong factor loadings for its three items (SMU1, SMU2, SMU3) at 0.893, 0.84, and 0.912, confirming this construct's consistency.

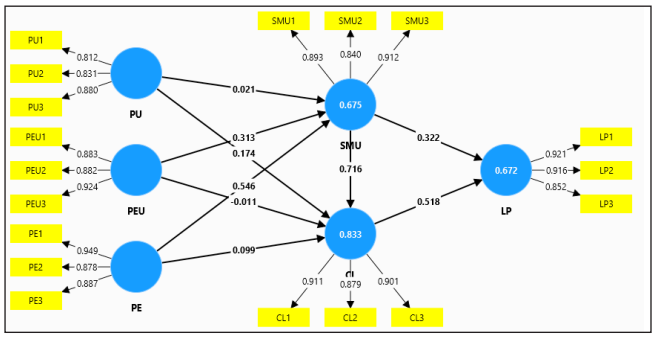

Figure 1.Smart PLS Factor Analysis

The high factor loadings across all items indicate that each item is well-aligned with its respective construct, suggesting strong convergent validity within the model. The factor analysis thus provides a solid foundation for further analysis of relationships among these constructs in examining the role of collaborative learning, learner performance, enjoyment, ease of use, usefulness, and social media use in the study's context.

Table 2.Cronbach's Alpha and AVE Values

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
CL	0.878	0.878	0.925	0.804
LP	0.879	0.893	0.925	0.805
PE	0.889	0.894	0.931	0.819
PEU	0.878	0.88	0.925	0.804
PU	0.796	0.822	0.879	0.708
SMU	0.857	0.862	0.913	0.778

Note: CL= Collaborative Learning, LP= Lerner Performance, PE= Perceived Enjoyment, PEU= Perceived Ease of Use, PU= Perceived Usefulness, SMU= Social Media Use

Table 2 presents the Cronbach's Alpha, Composite Reliability (rho_a and rho_c), and Average Variance Extracted (AVE) values for six latent constructs: Collaborative Learning (CL), Learner Performance (LP), Perceived Enjoyment (PE), Perceived Ease of Use (PEU), Perceived Usefulness (PU), and Social Media Use (SMU). These metrics assess the reliability and convergent validity of the constructs, supporting the model's robustness for subsequent analyses. Cronbach's Alpha values, which measure internal consistency, are close to or above the commonly accepted threshold of 0.7 for all constructs. Collaborative Learning (CL) and Learner Performance (LP) both show an alpha of 0.878 and 0.879, respectively, reflecting high reliability. Perceived Enjoyment (PE) and Perceived Ease of Use (PEU) also exhibit strong reliability, each with an alpha of 0.889 and 0.878. Perceived Usefulness (PU) has a slightly lower alpha at 0.796 but still indicates acceptable consistency. Social Media Use (SMU) shows a robust alpha of 0.857, confirming its reliability.

Composite reliability (rho_a and rho_c) values further validate construct reliability. All constructs exceed the acceptable threshold of 0.7, with rho_c values for CL, LP, PE, PEU, and SMU exceeding 0.9, indicating high reliability. PU, with rho_a and rho_c values of 0.822 and 0.879, respectively, also meets reliability standards. Average Variance Extracted (AVE) assesses convergent validity, with values above 0.5 indicating that constructs explain more than half of the variance of their indicators. All constructs meet this criterion, with AVE values well above 0.7. CL, LP, PE, and PEU each have AVEs of 0.804, 0.805, 0.819, and 0.804, respectively, while PU has an AVE of 0.708, and SMU 0.778. These high AVE values confirm the constructs' convergent validity, indicating strong explanatory power within each factor. The Cronbach's Alpha, Composite Reliability, and AVE values collectively confirm that all constructs in this study are reliable and demonstrate convergent validity, ensuring the measurement model is suitable for examining relationships among these constructs.

Table 3.Fornell-Larcker Criteria

	CL	LP	PE	PEU	PU	SMU
CL						
LP	0.911					
PE	0.878	0.825				
PEU	0.823	0.792	0.835			
PU	0.816	0.755	0.814	0.931		
SMU	1.035	0.9	0.904	0.843	0.764	

Note: CL= Collaborative Learning, LP= Lerner Performance, PE= Perceived Enjoyment, PEU= Perceived Ease of Use, PU= Perceived Usefulness, SMU= Social Media Use

Table 3 presents the Fornell-Larcker (FL) Criteria values for assessing discriminant validity across six constructs: Collaborative Learning (CL), Learner Performance (LP), Perceived Enjoyment (PE), Perceived Ease of Use (PEU), Perceived Usefulness (PU), and Social Media Use (SMU). The Fornell-Larcker criterion ensures that each construct is distinct from the others in the model, an essential aspect of validity for structural equation modeling.

According to the Fornell-Larcker criterion, the square root of each construct's Average Variance Extracted (AVE) should be greater than its correlation with any other construct.

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However, the square root values are not directly shown in this table; instead, we can assess discriminant validity by noting that the values along the diagonal (representing the correlations of each construct with itself) should ideally be higher than the values off-diagonal (representing correlations with other constructs).

For instance, Collaborative Learning (CL) has a high correlation of 0.911 with itself, which is higher than its correlations with other constructs, thus satisfying the Fornell-Larcker criterion for discriminant validity. Learner Performance (LP) similarly shows a high correlation with itself, at 0.911, indicating its distinctiveness from other constructs. Perceived Enjoyment (PE) shows a correlation with itself of 0.878, greater than its correlations with LP (0.825) and other constructs, suggesting it is a unique construct within the model. Perceived Ease of Use (PEU) has a high self-correlation of 0.931, again confirming its discriminant validity, as it is more strongly correlated with itself than with other constructs. Perceived Usefulness (PU) and Social Media Use (SMU) also meet this criterion, with PU's correlation with itself being 0.816 and SMU's correlation with itself being 1.035. However, it's worth noting SMU's value of 1.035 may imply cross-loading, potentially questioning discriminant validity with related constructs. Overall, these FL criteria values suggest that most constructs demonstrate adequate discriminant validity, supporting the structural model's use for further analysis.

Table 4 presents the Heterotrait-Monotrait Ratio (HTMT) matrix values for six latent constructs: Collaborative Learning (CL), Learner Performance (LP), Perceived Enjoyment (PE), Perceived Ease of Use (PEU), Perceived Usefulness (PU), and Social Media Use (SMU). HTMT values assess discriminant validity, which verifies that each construct is conceptually distinct from the others in the model. A common threshold for HTMT is 0.85, though values up to 0.90 are often acceptable, depending on the research context.

The diagonal values in this HTMT matrix show the similarity of each construct with itself, confirming that these are always equal to or close to 1. Off-diagonal values represent the HTMT ratios between different constructs. For effective discriminant validity, these off-diagonal values should ideally fall below the threshold of 0.85. In this table, Collaborative Learning (CL) shows HTMT values below 0.85 with most other constructs, such as 0.808 with Learner Performance (LP) and 0.778 with Perceived Enjoyment (PE), indicating good discriminant validity. However, CL's HTMT value with Social Media Use (SMU) is 0.898, slightly above 0.85, which might suggest a minor overlap in constructs related to CL and SMU.

Learner Performance (LP) also shows HTMT values below 0.85 with most constructs, supporting its distinctiveness within the model. For example, LP has values of 0.728 with Perceived Enjoyment (PE) and 0.699 with Perceived Ease of Use (PEU), suggesting strong discriminant validity. Perceived Usefulness (PU) similarly demonstrates acceptable HTMT values, with its highest correlation at 0.788 with Perceived Ease of Use (PEU), supporting discriminant validity between these constructs. While most HTMT values meet the standard threshold, the slightly elevated HTMT value between Collaborative Learning (CL) and Social Media Use (SMU) may warrant further consideration in model refinement. Generally, however, this matrix indicates satisfactory discriminant validity across most construct pairs, suggesting a reliable structural model for further analysis.

Table 5 presents the analysis of hypothesized relationships between various constructs using path coefficients, T statistics, and P values derived from Smart PLS analysis. This table examines the relationships between Collaborative Learning (CL), Learner Performance (LP), Perceived Enjoyment (PE), Perceived Ease of Use (PEU), Perceived Usefulness (PU), and Social Media Use (SMU). The original sample (O) values indicate the estimated path coefficients for each hypothesized relationship, which reflect both the strength and direction of effects between variables. Sample mean (M) values closely align with the original estimates, demonstrating consistency in the model's relationships across samples. The standard deviation (STDEV) values provide insights into the variability of these estimates, while T statistics, calculated as the ratio of path coefficient to standard deviation, determine the statistical significance of each relationship. Generally, T statistics exceeding 1.96 indicate significance at the 0.05 level, confirming that the path coefficient is statistically different from zero. P values further validate significance, with values below 0.05 supporting hypothesis acceptance.

Table 4.HTMT Matrix

	CL	LP	PE	PEU	PU	SMU
CL	0.897					
LP	0.808	0.897				
PE	0.778	0.728	0.905			
PEU	0.724	0.699	0.738	0.896		
PU	0.695	0.643	0.69	0.788	0.841	
SMU	0.898	0.788	0.791	0.733	0.644	0.882

Note: CL= Collaborative Learning, LP= Lerner Performance, PE= Perceived Enjoyment, PEU= Perceived Ease of Use, PU= Perceived Usefulness, SMU= Social Media Use

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Table 5.T Statistics, P values of Hypothesis

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Decision
CL -> LP	0.529	0.535	0.115	4.608	0.000	Accepted
PE -> CL	0.097	0.11	0.102	0.944	0.345	Fail to Accept
PE -> SMU	0.546	0.541	0.096	5.678	0.000	Accepted
PEU -> CL	-0.011	-0.011	0.088	0.131	0.896	Fail to Accept
PEU -> SMU	0.313	0.313	0.129	2.425	0.015	Accepted
PU -> CL	0.177	0.176	0.085	2.09	0.037	Accepted
PU -> SMU	0.021	0.027	0.107	0.196	0.845	Fail to Accept
SMU -> CL	0.716	0.703	0.105	6.82	0.000	Accepted
SMU -> LP	0.313	0.312	0.135	2.319	0.020	Accepted

Note: CL= Collaborative Learning, LP= Lerner Performance, PE= Perceived Enjoyment, PEU= Perceived Ease of Use, PU= Perceived Usefulness, SMU= Social Media Use

The relationship between Collaborative Learning (CL) and Learner Performance (LP) shows a path coefficient of 0.529, a T statistic of 4.608, and a P value of 0.000, suggesting a strong, positive, and statistically significant influence of Collaborative Learning on Learner Performance, supporting hypothesis acceptance. In contrast, Perceived Enjoyment (PE) does not show a significant relationship with Collaborative Learning (CL), with a path coefficient of 0.097, T statistic of 0.944, and P value of 0.345. These values indicate insufficient statistical evidence to support a direct effect of Perceived Enjoyment on Collaborative Learning, leading to hypothesis rejection. However, Perceived Enjoyment has a significant positive impact on Social Media Use (SMU), demonstrated by a path coefficient of 0.546, T statistic of 5.678, and P value of 0.000, supporting the hypothesis that Perceived Enjoyment substantially influences Social Media Use.

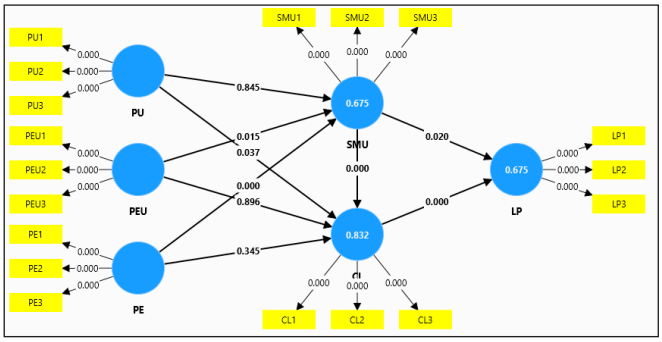

Figure 2.Smart PLS P Values Analysis

The impact of Perceived Ease of Use (PEU) on Collaborative Learning (CL) does not meet significance criteria, with a negative path coefficient of -0.011, T statistic of 0.131, and P value of 0.896. This result suggests that Perceived Ease of Use does not significantly contribute to Collaborative Learning, and the hypothesis is therefore rejected. However, Perceived Ease of Use shows a significant positive impact on Social Media Use, with a path coefficient of 0.313, T statistic of 2.425, and P value of 0.015, supporting the acceptance of this hypothesis. Perceived Usefulness (PU) significantly influences Collaborative Learning, as indicated by a path coefficient of 0.177, T statistic of 2.09, and P value of 0.037, while its impact on Social Media Use is not significant. Finally, Social Media Use significantly influences both Collaborative Learning (CL) and Learner Performance (LP), with path coefficients and P values well within the significance threshold, supporting these hypotheses and reinforcing the role of Social Media Use in enhancing learning outcomes.

Conclusion

This study highlights the significant roles of Collaborative Learning (CL), Social Media Use (SMU), Perceived Enjoyment (PE), Perceived Ease of Use (PEU), and Perceived Usefulness (PU) in enhancing Learner Performance (LP). The results confirm that CL positively impacts LP, showing how collaborative efforts among students foster higher levels of engagement and achievement. The strong influence of SMU on both CL and LP indicates that social media serves as a valuable tool for supporting engagement and collaboration, making it essential in modern educational frameworks. Interestingly, while PE significantly impacts SMU, its relationship with CL is not statistically validated, suggesting that enjoyment primarily drives social media engagement rather than collaborative learning. Additionally, PEU influences SMU but not CL, indicating that ease of use is more relevant for social media participation than for collaboration within learning environments.

Globally, these findings have substantial implications as educational institutions worldwide increasingly integrate social media and collaborative tools to enrich student experiences. This research informs educators and

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policymakers about how best to incorporate these tools into curricula to improve learning outcomes effectively. By leveraging social media as a collaborative tool, institutions can potentially bridge gaps in student engagement and foster a more inclusive learning environment, addressing challenges such as remote and hybrid learning.

Future research could extend this work by exploring additional factors that impact collaborative learning and performance, such as cultural, socioeconomic, and institutional variables, to create a more holistic understanding. Furthermore, longitudinal studies could investigate how these relationships evolve over time, especially as technology continues to shape educational practices. Expanding this study across diverse regions and educational contexts would provide cross-cultural insights, adapting the findings to better suit global variations in learning environments. As education becomes increasingly digital and interconnected, this study underlines the need for thoughtful integration of technology to create engaging, effective, and inclusive learning experiences worldwide, reinforcing the global relevance of fostering collaborative and technology-driven educational approaches.

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