

“Social networking site use and self-reported academic performance: Moderating roles of motivation and self-regulated learning”

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SOCIAL NETWORKING SITE USE AND SELF-REPORTED ACADEMIC PERFORMANCE: MODERATING ROLES OF MOTIVATION AND SELF-REGULATED LEARNING

Abstract

The growing integration of social networking sites (SNSs) into higher education has fueled debate about their contribution to academic performance. This study examines how three forms of academic SNS use, interaction with friends, interaction with lecturers, and cooperative learning, affect self reported performance among 510 undergraduate students from public, private, and international universities in Hanoi, Vietnam, and tests the moderating roles of academic motivation and self regulated learning. Multiple regression and moderation analyses (Hayes' PROCESS macro) were used.

Cooperative learning was the strongest predictor of performance ($\beta = .479$, $p < .001$), followed by interaction with lecturers ($\beta = .253$, $p < .001$) and interaction with friends ($\beta = .184$, $p < .001$), with the model explaining 63.8% of variance. Academic motivation and self regulated learning significantly strengthened the effect of friend interaction on performance but did not moderate the effects of lecturer interaction or cooperative learning. This indicates that structured, instructionally guided SNS activities produce stable academic benefits regardless of motivation or self regulation, while the value of informal peer interaction depends on these individual capacities. Performance and self regulated learning also differed significantly by gender, year of study, and university type, but not by discipline. Overall, results suggest that the academic effectiveness of SNSs depends on the structuredness of interaction and students' motivational and self regulatory capacities, not merely on usage intensity. Academic performance was measured via self report rather than objective academic records.

Keywords

social networking sites (SNSs), academic performance, cooperative learning, academic motivation, self-regulated learning, Vietnam

JEL Classification

I21, I23, D83

INTRODUCTION

The increasing integration of social networking sites (SNSs) into higher education has significantly transformed the way university students communicate, access information, and participate in learning activities. Traditionally, learning environments were largely teacher-centered, with students acting as passive recipients of knowledge (Franklin, 2011). However, the rapid development of digital technologies and online communication platforms has gradually shifted higher education toward more interactive and collaborative learning models. Educational institutions increasingly utilize online systems and networking technologies to support communication, assignment sharing, collaboration, and access to learning materials (Holsapple & Lee-Post, 2006; Piccoli et al., 2001). Within this transformation, SNSs have become an important component of contemporary learning environments.

Beyond their social functions, SNSs are increasingly used for academic purposes such as discussing coursework, sharing learning materials,

coordinating group assignments, and interacting with lecturers and classmates (Greenhow & Robelia, 2009). Recent studies suggest that SNSs may support communication, collaboration, knowledge sharing, and academic achievement by improving access to learning resources and facilitating interaction among students and instructors (Greenhow, 2011; McLoughlin & Lee, 2010). At the same time, concerns remain regarding the potentially negative consequences of SNS use, including distraction, procrastination, and problematic usage behaviors that may undermine academic performance (Kaplan & Haenlein, 2010). These contradictory findings indicate that the relationship between SNS use and academic performance is more complex than simply determining whether SNSs are beneficial or harmful.

The generalization of SNS use as a broad and homogeneous activity, without sufficiently distinguishing between its different academic forms, remains dominant in prior research and may represent a significant gap underlying this dilemma. When SNS use is treated as a single and undifferentiated behavior, its association with academic performance tends to be weak and inconsistent across studies (Liu et al., 2017; Marker et al., 2018). SNS-based learning behaviors, however, are not uniform. They differ substantially in their educational value depending on how, and for what academic purpose, students engage with these platforms. Collapsing such distinct behaviors into a single construct may therefore conceal the different pathways through which SNSs relate to performance. Looking at academic SNS use in various forms, as operationalized in the present study, may consequently offer a more coherent explanation of when and why SNSs support student performance.

Besides, relatively limited attention has been given to the psychological conditions under which SNS-based learning behaviors become academically effective. Students may differ substantially in their ability to transform SNS interactions into meaningful learning outcomes depending on their academic motivation and self-regulated learning capacities. Previous studies have shown that academic motivation plays an important role in learning engagement and achievement (Ryan & Deci, 2020), while self-regulated learning enhances students' ability to manage and direct their own learning processes in digital learning environments (Zimmerman & Schunk, 2011). However, the moderating roles of these factors remain underexplored in SNS-learning research, particularly in developing countries' contexts.

Taken together, current understanding of how SNSs shape academic performance remains fragmented as the academic value of specific forms of SNS use, and the individual conditions under which they become effective, are still insufficiently understood. Examining this gap is particularly instructive in Vietnam, where rapid digital expansion and one of the region's highest rates of social media adoption have made SNSs deeply embedded in the daily and academic lives of university students. Hanoi, as a major higher-education hub, offers an especially relevant setting in which large and digitally active student population are familiar with social networking platforms and technology-supported learning environments. Investigating these relationships here therefore addresses a clear evidence gap in a fast-digitalizing developing economy while generating insights into how universities can employ SNSs for learning.

1. LITERATURE REVIEW

1.1. Social networking sites as educational communication environments

Social networking sites (SNSs) are web-based platforms that let users create personal profiles, express themselves, communicate with others, and build or maintain social connections with-

in a network (Boyd & Ellison, 2007). What ties these features together is a single purpose: making social ties visible and allowing people to stay in touch regardless of time or distance (Mlaiki et al., 2017; Mo et al., 2024). This matters for education, where much of learning happens through exchange. SNSs work as a ground where learners ask questions, exchange learning materials, receive feedback, clarify difficult content, and coordinate academic tasks, supporting knowledge transfer

and exchange when (Chen & Bryer, 2012). Where team tasks, discussion, feedback, peer assistance are frequent activities like higher education, SNSs can become useful tools for sharing knowledge, encouraging participation, and supporting collaborative learning (Suti & Sari, 2023).

SNSs, however, is not inherently beneficial for academic purposes. Due to its multi-purpose nature, ranging from communication, social interaction to entertainment, what students gain from them vary greatly depending on how they are used. Socially oriented use tends to be linked with positive outcomes among college students, whereas passive or entertainment-driven use encourages comparison and non-interactive consumption which has been linked to less favorable psychological outcomes (Wang et al., 2014; Xiang & Kong, 2024). Excessive use can also disrupt academic performance, daily routines, peer relationships, and class participation (Piao et al., 2025). The academic value of SNSs therefore rests not only on whether students use them for learning, but also on whether they stay purposeful, engaged, and in control of how they use them.

1.2. SNS-based academic activities and student performance

In academic contexts, especially higher education, self-learning is an integral part of academic experience beyond formal classroom time (Barhoumi, 2023). In this environment, SNSs can act as a communication channel that keeps students connected to course-related activities and academic contact. The ease of staying in touch outside the classroom can turn casual online interaction into genuine academic participation and collaboration, which can in turn translate into better academic performance (Greenhow, 2011; Hrastinski & Aghaei, 2012).

SNSs strengthen academic interaction via its communicative capabilities with various parties. Peer-based interaction provides a horizontal form of academic support, through which students can exchange materials, discuss course content, compare their understanding, and give informal help to classmates in a flexible and timely way (Greenhow, 2011; Junco et al., 2013). Peer support alone, however, may not be enough

for more demanding or authoritative questions. Interaction with lecturers provides a more instructional form of support including clarification, guidance, and feedback. Lecturer presence and communication through SNSs can also improve students' attitudes toward the teacher, course, and classroom, while also supporting engagement and performance (Hanaysha et al., 2023; Mazer et al., 2007). Two forms of interaction complement each other, enable both informal academic support, and instructional guidance.

While peer interaction mainly concerns communication and informal support, cooperative learning reflects a more coordinated activity in which students work together to exchange ideas, share responsibilities, solve learning problems, and complete academic tasks (Al-Qahtani & Lin, 2016; Junco et al., 2013). SNSs support this process by providing flexible environment for group discussion, task coordination and information sharing. Through these activities, students can learn from one another, compare perspectives, and complete academic tasks more effectively, which can ultimately lead to stronger academic achievement (Gunawardena et al., 2009; Kitsantas et al., 2016).

With appropriate usage, SNSs can extend beyond academic communication and collaboration to address a common limitation of classroom teaching. Formal classroom settings are often held back by large class sizes, limited instructing time, and fixed schedules, which permit little room for deeper interaction, cooperation, and expression of ideas. When SNSs serve as channels for academic activity, students can stay involved beyond class hours by discussing course topics, working with others, building learning relationships, and voicing their opinions more freely (Shivakumaraswamy et al., 2025). These activities can strengthen students' engagement in learning. When students participate more dynamically in these activities, stronger learning engagement is developed, leading to better understanding of course content and broader knowledge and attention to learning tasks (Perkmann et al., 2021; Villaluz et al., 2026). In this way, academic engagement through SNSs may improve learning performance.

1.3. Motivational and self-regulatory conditions in SNS-based learning

SNS-based academic activities effect differs between students. How much a student gains depends largely on how far their use is directed toward learning goals. Since SNSs were built first and foremost for leisure and social connection, staying on task in such a disrupted environment often takes more than good intentions. Individual differences, for that reason, may matter more than it looks in this context.

One source of this variation is how committed students are to their learning. Students who are more committed tend to invest time in their studies, work through learning materials carefully, and hold themselves to higher standards in both the process and the outcome. This commitment is closely tied to academic motivation, which shapes the direction, initiation, intensity, and persistence of learning behavior (Urhahne & Wijnia, 2023), and is an important component in shaping student engagement, achievement, and academic performance (Muhammad et al., 2023; Wu, 2019). In SNS-based learning, this commitment may help students translate SNS-based academic functions into performance benefits. When students are motivated, their interaction with friends and lecturers, along with their cooperative learning through SNSs, is more likely to be used deliberately to clarify ideas and complete tasks, which can improve learning outcomes. In contrast, less motivated students may treat the same activities more casually, reducing the likelihood of these activities to be converted into academic gains. Accordingly, academic motivation is expected to strengthen the positive relationship between SNS-based academic activities and student performance.

Another source of determination is self-regulated learning (SRL), which refers to students' ability to plan, monitor, and evaluate their learning processes (Zimmerman & Schunk, 2011). SRL becomes especially important in digital environments, where students exercise a high level of autonomy in managing their participation and engagement. Z. Xu et al. (2023) confirmed that SRL significantly enhances academ-

ic achievement in online and blended learning contexts. As SNS-based learning shares many features with these environments, students who actively manage their own learning are more likely to use these platforms effectively, integrate shared information into their academic tasks, and, at the same time, avoid potential distractions. Thus, the academic benefits of SNS-based interaction may depend on students' level of self-regulated learning. The positive relationship between SNS-related academic experiences and student performance is therefore expected to be stronger among students with higher levels of SRL.

1.4. Conceptual framework

This section aims to explain how SNS based academic functions, namely interaction with friends, interaction with lecturers, and cooperative learning, jointly influence student performance, and how this influence is shaped by students' academic motivation and self regulated learning.

Based on the above discussion, this study develops an integrated framework to explain how SNS-based academic activities contribute to student performance in higher education. The framework (Figure 1) proposes that SNSs support learning through four academic functions: interaction with friends and lecturers, engagement, and cooperative learning. These functions are expected to enhance student performance by extending academic communication, collaboration, and participation beyond formal classroom time. However, because SNSs have a dual nature, their academic value may depend on students' individual learning conditions. Accordingly, academic motivation and self-regulated learning are proposed as moderating factors that strengthen the relationships between SNS-based academic activities and student performance. The following hypotheses are therefore proposed:

- H1: *Interaction with friends through SNSs positively influences student performance.*
- H2: *Interaction with lecturer through SNSs positively influences student performance.*
- H3: *Engagement through SNSs positively influences student performance.*

Source: Adopted from Alaslani and Alandejani (2020).

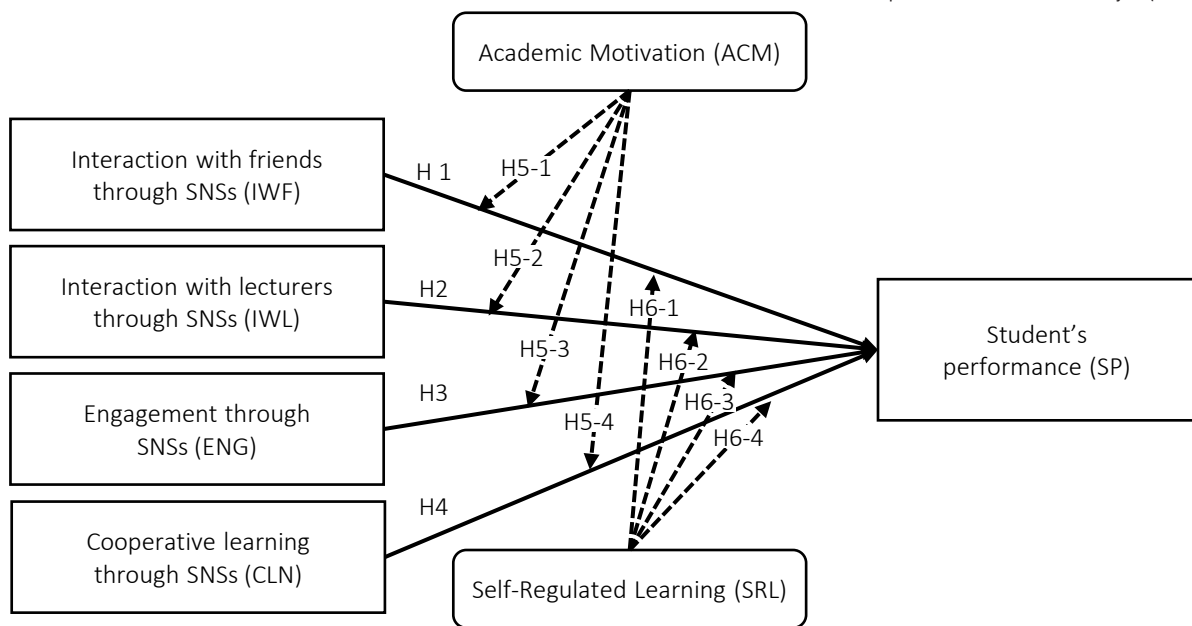


Figure 1. A conceptual model of the impact of SNSs on the performance of students

H4: Cooperative learning through SNSs positively influences student performance.

H5.1: Academic motivation positively moderates the relationship between peer interaction through SNSs and student performance.

H5.2: Academic motivation positively moderates the relationship between lecturer interaction through SNSs and student performance.

H5.3: Academic motivation positively moderates the relationship between engagement through SNSs and student performance.

H5.4: Academic motivation positively moderates the relationship between cooperative learning through SNSs and student performance.

H6.1: Self-regulated learning positively moderates the relationship between peer interaction through SNSs and student performance.

H6.2: Self-regulated learning positively moderates the relationship between lecturer interaction through SNSs and student performance.

H6.3: Self-regulated learning positively moderates the relationship between engagement through SNSs and student performance.

H6.4: Self-regulated learning positively moderates the relationship between cooperative learning through SNSs and student performance.

2. METHODOLOGY

This study employed a quantitative cross-sectional survey design to examine the relationships between SNS-based academic activities and student performance among undergraduate students in Hanoi, Vietnam. A convenience sampling approach was adopted due to accessibility and time constraints. Nevertheless, efforts were made to obtain a relatively balanced representation in terms of gender, year of study, academic major, and SNS usage patterns in order to reduce potential sampling bias.

Data were collected through both online (Google Forms) and paper-based questionnaires between October 15 and December 10, 2025, yielding 587 responses. Following a data screening process to identify and remove invalid or low-quality responses, 510 valid responses were retained for the final analysis. Detailed information about the sample is presented in Table 1. Prior to completing the questionnaire, participants were informed about the purpose of the study and assured that all responses would remain anonymous and confi-

dential. Participation in the survey was voluntary, and completion of the questionnaire was treated as implied consent.

The survey instrument consisted of 26 observed variables measuring seven constructs: Interaction with Friends (3 items) and Interaction with Lecturers (3 items) adapted from Alaslani and Alandejani (2020); Cooperative Learning (4 items) and Student Performance (4 items) adapted from Fonseca et al. (2014); Engagement through SNSs (4 items) adapted from Gallini and Moely (2003) and So and Brush (2008); Academic Motivation (5 items) developed by Vallerand et al. (1992); and Self-Regulated Learning (3 items) adopted from Shi et al. (2025). All items were assessed using a five-point Likert scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”). The questionnaire was originally developed in English and translated into Vietnamese using the back-translation technique to ensure linguistic consistency between the two versions. The measurement items are presented in Appendix A.

Descriptive statistics were first employed to summarize the demographic characteristics of the respondents. Construct reliability was assessed using Cronbach’s Alpha, with 0.70 considered the acceptable threshold. Multiple regression analysis was then conducted to test the direct effects of SNS-based academic activities on student performance (*H1-H4*). Besides, moderation analysis using Hayes’ PROCESS macro (Model 1) in SPSS with 5,000 bootstrap samples and a 95% confidence interval was applied to examine the moderating roles of academic motivation (*H5.1-H5.4*) and self-regulated learning (*H6.1-H6.4*).

3. RESULTS

3.1. Sample profile

Table 1 presents the demographic characteristics of the respondents. The gender distribution was relatively balanced, with 48.0% male and 52.0% female students. In terms of year of study, fourth-year students and above accounted for the largest proportion (44.5%), followed by third-year students (23.7%), second-year students (19.6%), and freshmen (12.2%). The high proportion of third-

and fourth-year students is considered beneficial, as these students are likely to have accumulated more academic experience and greater exposure to SNS-based learning activities during their university studies.

Regarding academic majors, Engineering and Technology accounted for the largest share of the sample (42.9%), followed closely by Social Sciences and Economics (39.8%), while the remaining 17.3% came from other disciplines. Respondents were also drawn from different university types, including public universities (54.7%), private universities (33.7%), and international universities (11%). Overall, the sample reflects a relatively diverse distribution across key demographic characteristics, supporting the internal consistency and descriptive adequacy of the analysis.

Table 1. Overview of the sample profile

Source: Compilations by the authors.

	Respondents	Frequency	Percent (%)
Gender	Male	245	48.0
	Female	265	52.0
Year of study	Freshman	62	12.2
	Second-year student	100	19.6
	Third-year student	121	23.7
	Fourth-year and above student	227	44.5
Major	Engineering & Technology	219	42.9
	Social Sciences & Economics	203	39.8
	Others	88	17.3
Universities	Public	279	54.7
	Private	197	33.7
	International	59	11.6

3.2. Construct refinement and model revision

Prior to assessing reliability and validity, discriminant validity of the measurement model was examined using the Heterotrait-Monotrait ratio criterion. The results indicated that the HTMT value between Engagement through SNSs ENG and Interaction with Friends IWF exceeded the conservative threshold of 0.90 as proposed by Henseler et al. (2015), with values approaching 1.00. This result suggested a substantial lack of discriminant validity between the two constructs. A detailed examination of item content

Source: Adapted and modified from Alaslani and Alandejani (2020).

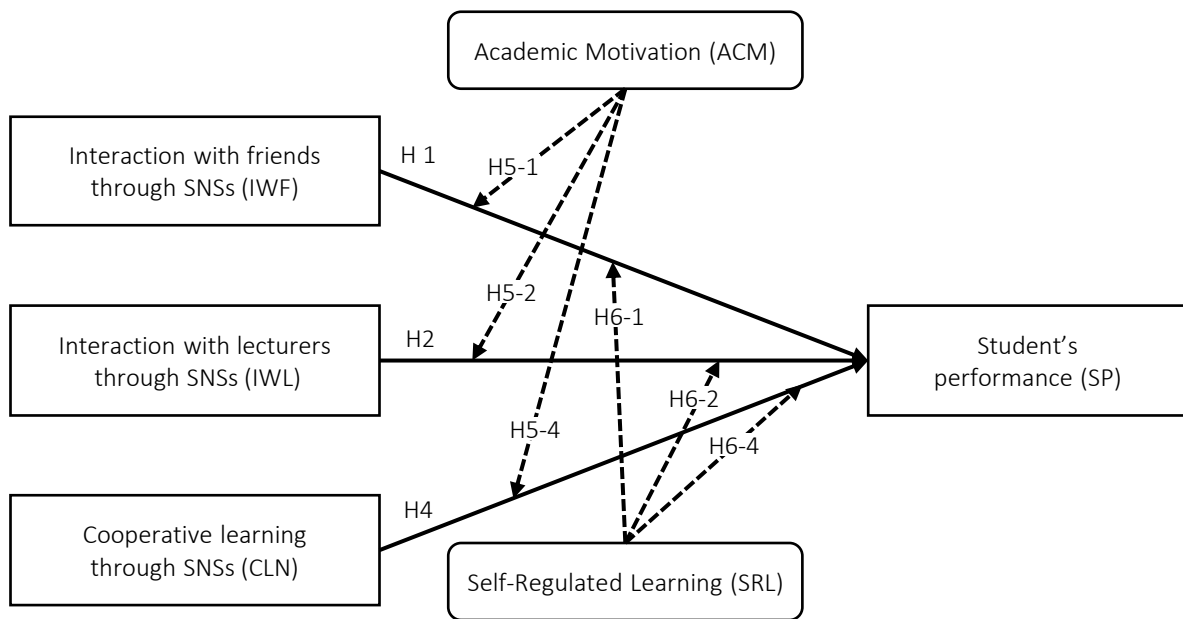


Figure 2. Revised conceptual model of SNS use and student academic performance

further confirmed a strong conceptual overlap between ENG and IWF. Both constructs primarily reflected students' perceptions of positive peer related interaction through SNS use rather than two theoretically distinct dimensions. Based on both statistical evidence and conceptual similarity, ENG and IWF were therefore merged into a single construct, which was retained under the label Interaction with Friends IWF. Following the merge, all original items from both constructs were re-evaluated. Three items were removed due to conceptual redundancy and measurement issues. The removed items include IWF1 which is "Easily interact with my classmates when using SNS.", ENG1 which is "Feel more connected to classmates and instructors when using SNS.", and ENG4 which is "Using SNSs has helped to release stress, update and share information." ENG1 was removed due to conceptual overlap with Interaction with Lecturers IWL, while ENG4 was excluded because it captured a broader emotional and informational outcome rather than peer interaction. IWF1 was removed due to weaker measurement quality and overlap with general interaction intensity rather than specific peer learning behavior. The final merged IWF construct consists of four retained items. These include IWF2 "Communicate effectively with my classmates through SNS.", IWF3 "Often

share study materials with classmates via SNS.", ENG2 "Develop a sense of cooperation through SNS.", and ENG3 "Feel that my opinions are valued when using SNS." These items jointly represent four core dimensions of peer interaction, namely communication, material sharing, cooperation, and opinion expression. This construct merger implies that the original conceptual model and associated hypotheses involving ENG as a distinct predictor need to be revised, with the merged IWF construct replacing the separate roles previously attributed to IWF and ENG. Consequently, *H3*, *H5.3*, and *H6.3*, which were originally associated with ENG, are no longer applicable and have been removed. The revised conceptual model, excluding these hypotheses, is presented in Figure 2.

3.3. Assessment of reliability and validity

Building on the refined construct set established above, the measurement model was further assessed for discriminant validity, reliability, and convergent validity. The recomputed HTMT matrix revealed that the value between Cooperative Learning (CLN) and Student Performance (SP) exceeded 0.90 (0.912), with cross-loading analysis identifying CLN2 (Learning through SNS more ef-

fective than face-to-face learning) and SP2 (SNSs helped to get high results) as the main contributors; both items were removed accordingly. The final HTMT matrix is presented in Table 2.

All constructs satisfied the Fornell-Larcker criterion. HTMT values between CLN and SP (0.902), CLN and SRL (0.870), and SP and SRL (0.885) exceeded 0.85, though close to the more liberal 0.90 threshold for conceptually similar constructs (Henseler et al., 2015). As these reflect independent-dependent and moderator-dependent relationships rather than measurement overlap, the elevated values are considered acceptable (Rönkkö & Cho, 2022) and further addressed in the Limitations section.

Table 2. Discriminant validity: Fornell-Larcker criterion and HTMT ratios

Source: Compilations by the authors.

Variable	IWF	IWL	CLN	SP	ACM	SRL
IWF	0.963	0.587	0.646	0.663	0.786	0.755
IWL	0.538	0.885	0.779	0.785	0.790	0.739
CLN	0.580	0.658	0.865	0.902	0.826	0.870
SP	0.597	0.666	0.751	0.868	0.801	0.885
ACM	0.749	0.708	0.728	0.708	0.888	0.843
SRL	0.702	0.646	0.747	0.763	0.768	0.904

Note: Diagonal (bold) = $\sqrt{\text{AVE}}$; below diagonal = correlations; above diagonal = HTMT ratios.

Table 3 shows strong internal consistency, with Cronbach's Alpha ranging from 0.831 to 0.974, exceeding the 0.70 threshold (Hair et al., 2022). Composite reliability (0.899-0.981) and AVE (0.748-0.927) further confirm reliability and convergent validity, exceeding the 0.50 AVE threshold (Fornell & Larcker, 1981). The notably high values for IWF ($\alpha = 0.974$, AVE = 0.927) likely reflect the ENG-IWF merger and a ceiling effect in students' self-reported SNS perceptions, consistent with common method variance (Podsakoff et al., 2003) rather than item redundancy.

Table 3. Reliability and validity indicators

Source: Compilations by the authors.

Constructs	Number of items	Cronbach's α	Composite reliability (ρ_c)	AVE	$\sqrt{\text{AVE}}$
Interaction with Friends (IWF)	4	0.974	0.981	0.927	0.963
Interaction with Lecturers (IWL)	3	0.862	0.916	0.783	0.885
Cooperative Learning (CLN)	3	0.831	0.899	0.748	0.865
Academic Motivation (ACM)	5	0.933	0.949	0.789	0.888
Self-Regulated Learning (SRL)	3	0.889	0.931	0.818	0.904
Student Performance (SP)	3	0.836	0.902	0.753	0.868

3.4. Descriptive analysis

To provide additional insights into potential differences among respondents, Student Performance (SP) and Self-Regulated Learning (SRL) were compared across selected demographic variables, including gender, year of study, academic discipline, and university type. Welch's ANOVA was employed due to violations of the homogeneity of variance assumption in most comparisons.

The results reveal significant differences by gender. Male students reported significantly higher levels of both SP and SRL than female students (SP: Welch $F(1, 500.44) = 5.39$, $p = .021$; SRL: Welch $F(1, 500.53) = 9.54$, $p = .002$). This finding may partly reflect differences in academic self-efficacy and confidence in self-regulated learning processes, which have been highlighted in previous studies on university students and online learning contexts (Xu et al., 2022).

Significant differences were also observed across years of study for both SP and SRL ($p < .001$), with first-year students reporting the lowest scores for both constructs, while second and third year students showed the highest levels. This pattern is reasonable, as second and third year students are generally more academically adapted and have developed more stable learning habits and self-regulation skills after the transition from high school to university. In contrast, fourth year students showed slightly lower scores, which may be influenced by graduation pressure, internship requirements, part-time employment, and thesis related responsibilities that can reduce their focus on academic learning activities.

Regarding academic discipline, no significant differences were found across majors for either SP ($p = .094$) or SRL ($p = .108$), indicating that the effects

Table 4. Mean differences in student performance and self-regulated learning across demographic groups

Source: Compilations by the authors.

Gender	N	SP		SRL	
		Mean	SD	Mean	SD
Male	245	3.876	.783	4.522	.662
Female	265	3.697	.959	4.321	.810
Year of study	N	Levene's $p = .001$; Welch $F(1,500.44) = 5.39, p = .021$		Levene's $p = .003$; Welch $F(1,500.53) = 9.54, p = .002$	
1 st year student	62	3.296	1.118	3.914	1.051
2 nd year student	100	3.993	.767	4.567	.589
3 rd year student	121	3.986	.680	4.609	.554
4 th year student	227	3.715	.895	4.388	.742
Major	N	Levene's $p < .001$ Welch $F(3,193.79) = 9.50, p < .001$		Levene's $p < .001$ Welch $F(3,192.80) = 10.00, p < .001$	
Business/ Economics	203	3.688	.944	4.356	.841
Engineer, IT	219	3.874	.792	4.496	.657
Others	88	3.777	.934	4.364	.727
University	N	Levene's $p = .047$ Welch $F(2,230.07) = 2.39, p = .094$		Levene's $p = .073$ Welch $F(2,235.78) = 2.25, p = .108$	
Public	279	3.703	.941	4.326	.813
Private	172	3.909	.811	4.543	.684
International	59	3.797	.756	4.486	.530
		Levene's $p = .056$ Welch $F(2,170.39) = 3.03, p = .051$		Levene's $p = .004$ Welch $F(2,186.52) = 4.87, p = .009$	

of SNS-supported learning may be relatively consistent across fields of study.

Regarding university type, students from private universities reported relatively higher SP and SRL scores compared to public and international universities; however, the difference reached significance only for SRL ($p = .009$), while the difference in SP approached but did not reach significance ($p = .051$). This difference in SRL may reflect the more competitive and self-directed learning environments typically associated with private universities, where students are expected to take greater responsibility for managing their own academic progress. Overall, these findings provide additional insights into the heterogeneity of students' learning experiences and complement the main structural model results.

3.5. Hypotheses testing

The multiple regression analysis was conducted to examine the direct effects of three SNS-based learning behaviors on student performance, controlling for gender, year of study, and university type. The overall regression model was statistically significant ($F(9, 500) = 98.266, p < .001$), indicating that the predictors jointly explained a

significant proportion of the variance in student performance. Specifically, the model accounted for 63.9% of the variance in student performance ($R^2 = .639$; adjusted $R^2 = .632$). This proportion of explained variance is consistent with prior studies examining social media use, collaborative learning, and student learning outcomes, which have reported comparable R^2 values ranging from approximately 0.56 to 0.63 (Alalwan, 2022; Al-Rahmi et al., 2015), reflecting the common characteristic of this research stream in which both predictor and outcome variables are measured through self-reported perceptions collected from the same respondents. All Variance Inflation Factor (VIF) values ranged from 1.031 to 2.815, well below the recommended threshold of 5, indicating that multicollinearity was not a concern.

Among the three hypothesized predictors, cooperative learning (CLN) emerged as the most influential determinant of student performance ($\beta = .474, t = 12.247, p < .001$), providing strong support for $H4$. Its standardized effect was more than twice as large as that of interaction with friends (IWF; $\beta = .187, t = 5.402, p < .001$) and approximately 1.9 times greater than that of interaction with lecturers (IWL; $\beta = .248, t = 6.631, p < .001$), highlighting the dominant role of cooperative learning in en-

Table 5. Multiple regression analysis predicting student performance

Source: Compilations by the authors.

Independent variables	B	β	t	p	VIF	Hypothesis
IWF	.371	.187	5.402	.000	1.662	H1 – supported
IWL	.233	.248	6.631	.000	1.939	H2 – supported
CLN	.471	.474	12.247	.000	2.074	H4 – supported
Female (ref. male)	-.009	-.005	-.186	.853	1.031	Control variable
2 nd year (ref. 1 st year)	.042	.019	.466	.642	2.278	Control variable
3 rd year (ref. 1 st year)	.011	.005	.123	.902	2.469	Control variable
4 th year (ref. 1 st year)	-.032	-.018	-.403	.687	2.815	Control variable
Private uni. (ref. public)	.016	.008	.290	.772	1.169	Control variable
International uni. (ref. public)	-.004	-.001	-.047	.963	1.160	Control variable

Note: N = 510. R = .800; adjusted R² = .632; F = 98.266, p < .000. VIF = Variance Inflation Factor. Dependent variable: Student Performance. B = unstandardized coefficient; β = standardized coefficient.

hancing academic performance. Both interaction with friends and interaction with lecturers also contributed positively, though with smaller effects, supporting H1 and H2. None of the demographic control variables, gender, year of study, or university type, significantly predicted student performance (all p > .64), and their inclusion changed the coefficients of IWF, IWL, and CLN only marginally, indicating that these effects are robust and not confounded by students' demographic background. Overall, the results indicate that the collaborative and instructionally structured dimensions of SNS-based learning activities play a more critical role in fostering student performance than informal peer or instructor interaction alone, and that this pattern holds regardless of students' demographic characteristics.

Following the regression analysis, a series of moderation analyses were conducted using Hayes' PROCESS macro (Model 1) to examine whether Academic Motivation (ACM) and Self-Regulated

Learning (SRL) moderated the relationships between the three SNS-based learning behaviors and Student Performance (SP). The results are summarized in Table 6.

Regarding the moderating role of Academic Motivation (ACM), only one of the three interaction effects was statistically significant. Specifically, ACM significantly strengthened the relationship between Interaction with Friends through SNSs (IWF) and Student Performance (B = 0.381, p < .001), thereby supporting H5.1. In contrast, ACM did not significantly moderate the relationships between Interaction with Lecturers through SNSs (IWL) and Student Performance (B = 0.028, p = .397) or between Cooperative Learning through SNSs (CLN) and Student Performance (B = 0.003, p = .914), leading to the rejection of H5.2 and H5.4. This finding suggests that academic motivation strengthens the benefits of informal peer interaction through SNSs but does not alter the influence of instructor interaction or collaborative learning

Table 6. Summary of moderation analyses predicting Student Performance

Source: Compilations by the authors.

Predictor (X)	Moderator (W)	B (Int_1)	p	ΔR^2	Hypothesis
IWF	ACM	0.381	< 0.001	0.028	H5.1 – supported
IWL	ACM	0.028	0.397	0.001	H5.2 – not supported
CLN	ACM	0.003	0.914	0.000	H5.4 – not supported
IWF	SRL	0.312	< 0.001	0.015	H6.1 – supported
IWL	SRL	0.002	0.945	0.000	H6.2 – not supported
CLN	SRL	0.012	0.630	0.000	H6.4 – not supported

Note: N = 510. B (Int_1) = unstandardized coefficient of the interaction term. ΔR^2 = additional variance in Student Performance explained by the interaction beyond the main effects. Dependent variable: Student Performance.

on academic performance, both of which are relatively more structured and externally guided.

Concerning the moderating role of Self-Regulated Learning (SRL), a similar pattern emerged. SRL significantly moderated the relationship between IWF and Student Performance ($B = 0.312$, $p < .001$), supporting *H6.1*. However, SRL did not significantly moderate the relationships between IWL and Student Performance ($B = 0.002$, $p = .945$) or between CLN and Student Performance ($B = 0.012$, $p = .630$), resulting in the rejection of *H6.2* and *H6.4*. Overall, these findings indicate that both Academic Motivation and Self-Regulated Learning serve as boundary conditions specifically for the relationship between informal peer interaction (IWF) and student performance, while the effects of instructor interaction and cooperative learning on academic performance remain relatively stable across students with varying levels of motivation and self-regulation.

4. DISCUSSION

The study examined the effects of three SNS-based learning behaviors, namely cooperative learning through SNSs CLN, interaction with lecturers through SNSs IWL, and interaction with friends through SNSs IWF on Student Performance SP among Vietnamese university students in Hanoi. Besides, the study tested whether academic motivation ACM and self-regulated learning SRL moderate these relationships. Overall, the results confirm that social networking sites SNSs can enhance Student Performance. However, the magnitude and mechanism of influence differ substantially across types of SNS-based learning behaviors.

Cooperative learning through SNSs emerged as the strongest predictor of student performance ($\beta = .474$, $t = 12.247$, $p < .001$), far exceeding the effects of both lecturer interaction and peer interaction. This indicates that structured task-oriented collaboration via SNSs plays a central role in improving academic outcomes. This finding is consistent with prior research emphasizing the importance of collaborative learning in technology-enhanced environments (Al-Qahtani & Lin, 2016; Kitsantas et al., 2016). At the same time, the result extends this literature by showing that the explanatory

power of the model $R^2 = .639$ is largely driven by CLN, which accounts for the majority of variance explained in student performance. This pattern aligns with earlier SNS-based learning studies that rely on self-reported perceptions of learning benefits (Alalwan, 2022; Al-Rahmi et al., 2015). Therefore, the findings should be interpreted with caution regarding perceptual measurement effects. Importantly, the effect of CLN on student performance was not significantly moderated by either academic motivation ACM or self-regulated learning SRL. This suggests that structured collaborative learning activities delivered through SNSs generate relatively consistent academic benefits across students regardless of individual differences in motivation or self-regulatory capacity.

Interaction with lecturers through SNSs emerged as the second strongest predictor of Student Performance ($\beta = .248$), and it had a stronger effect than peer interaction which recorded ($\beta = .187$). This indicates that lecturer mediated communication contributes more to academic outcomes than informal peer exchanges. Both IWL and IWF positively influenced student performance, supporting Greenhow (2011) who argued that SNSs improve academic outcomes by enhancing communication quality and access to learning resources. However, the stronger effect of lecturer interaction likely reflects its more structured and academically focused nature. Lecturer communication is typically aligned with course objectives, assessment requirements, and formal feedback mechanisms. Besides, the instructor-centered tradition in Vietnamese higher education, where lecturers are often viewed as primary academic authorities, may further reinforce this effect. This suggests that cultural and institutional contexts should be more explicitly considered in future research on SNS-based learning. Similar to CLN, the effect of IWL on student performance was not significantly moderated by either ACM or SRL. This indicates that externally structured learning interactions tend to produce stable academic benefits across different student profiles.

Interaction with friends had a positive but weaker direct effect on student performance ($\beta = .187$ and $p < .001$). This suggests that informal peer communication contributes to academic outcomes but to a lesser extent than structured collaborative

and lecturer-led interactions. During measurement model refinement, the original construct engagement through SNSs ENG was found to overlap substantially with IWF both conceptually and empirically. As a result, the two constructs were merged into a single factor. This indicates that behaviors such as relationship building, cooperative spirit, and opinion expression are in practice inseparable from peer interaction in students SNS usage. Unlike CLN and IWL, the effect of IWF on student performance was conditional. It was significantly moderated by academic motivation ($B = .381, p < .001$) and self-regulated learning ($B = .312, p < .001$). This finding is consistent with Ryan and Deci (2020) and Z. Xu et al. (2023), emphasizing the role of internal motivational and self-regulatory processes in translating informal learning environments into academic outcomes. Because peer interaction on SNSs is largely unstructured and self initiated, its effectiveness depends heavily on whether students intentionally direct these interactions toward academic purposes.

Taken together, the findings suggest that the structuredness of SNS-based learning activities serves as a key boundary condition shaping the role of individual psychological factors. CLN and IWL are externally structured (through tasks, instructors, and course requirements), and therefore generate stable academic benefits regardless of ACM and SRL. IWF is informal and self-directed, and therefore its effectiveness depends strongly on students' motivation and self-regulation capacity.

Notably, while gender, year of study, and university type were associated with differences in student performance when examined independently (see Table 4), these demographic factors no longer significantly predicted student performance once IWF, IWL, and CLN were accounted for in the regression model (see Table 5), and their inclusion left the effects of the three SNS-based predictors virtually unchanged.

This suggests that demographic variation in student performance may operate indirectly through differences in students' SNS-based learning behaviors, such as higher engagement in cooperative learning among more experienced students, rather than reflecting a direct demographic effect. This interpretation warrants further investigation, ideally through mediation analysis in future research.

The additional demographic analysis provides additional insights for higher education practice. First-year students showed lower levels of both student performance and self-regulated learning, indicating a need for early academic support. Universities should consider orientation programs, mentoring systems, and guided SNS-based learning activities to help students adapt to digital learning environments. Final-year students also exhibited relatively lower outcomes, which may reflect shifting priorities toward internships, thesis work, and career preparation. This suggests that SNS-based learning strategies should be adapted to different academic stages rather than applied uniformly. In contrast, the absence of significant differences across academic disciplines suggests that SNS-based learning approaches are broadly applicable. This supports the development of institution-wide digital learning strategies rather than discipline-specific interventions.

Overall, the study contributes to the growing literature on SNS-supported learning by demonstrating that academic effectiveness depends not simply on SNS usage, but more importantly on the structuredness of learning activities and the role of individual motivation and self-regulation. Structured SNS-based learning (CLN and IWL) produces consistent academic benefits across students, while informal peer interaction (IWF) only translates into improved performance when supported by strong internal motivational and self-regulatory capacities.

CONCLUSIONS

This study examined the effects of SNS-based learning behaviors on student performance among university students in Hanoi, Vietnam, and investigated the moderating roles of academic motivation and self-regulated learning. The findings indicate that cooperative learning through SNSs is by far the strongest predictor of student performance, followed by interaction with lecturers, which exerts a stronger academic influence than interaction with friends. Notably, the construct originally conceptualized as

engagement through SNSs substantially overlapped with peer interaction and was merged into a single construct, indicating that engagement and informal peer interaction are, in practice, empirically inseparable. This merged construct's academic benefit was conditional, strengthening among students with higher motivation and self-regulation, whereas the effects of cooperative learning and lecturer interaction remained stable across students.

These results suggest that SNS effectiveness depends less on frequency of participation and more on the structuredness of the activity, with goal-oriented collaborative and instructional interactions yielding the strongest, most consistent benefits, while informal peer interaction requires motivation and self-regulation to translate into academic gains. Universities and instructors should therefore prioritize structured cooperative tasks and lecturer engagement through SNSs while nurturing students' motivational and self-regulatory capacities. Theoretically, the study offers evidence from the under-researched Vietnamese context and clarifies the boundary conditions under which peer-based SNS interaction benefits performance.

This study has several limitations. The cross-sectional design precludes causal inference. Convenience sampling was used due to accessibility constraints, and although efforts were made to balance gender, year of study, and major, the sample was drawn from a single region (Hanoi), limiting generalizability to other cultural and institutional contexts. All constructs, including student performance, were measured through students' self-reported perceptions rather than objective records (e.g., GPA), collected from a single source at one time point, likely contributing to common method bias. This is consistent with the elevated HTMT values observed between CLN and SP, CLN and SRL, and SP and SRL, which exceeded the conservative threshold despite satisfying the Fornell-Larcker criterion and bootstrapped confidence intervals; these values may partly reflect genuine substantive associations, given that CLN-SP and SP-SRL correspond to independent-dependent and moderator-dependent relationships rather than measurement overlap, though common method variance cannot be ruled out. The need to merge engagement with peer interaction further suggests these constructs may be less conceptually distinct than prior literature assumes, at least in this context. Future research should adopt longitudinal designs, probability-based sampling across multiple regions, and objective or multi-source performance data to address these limitations.

AUTHOR CONTRIBUTIONS

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APPENDIX A

Table A1. Measurements

Code	Item wording	Sources and note
Interaction with Friends (IWF)		Adapted from Alaslani and Alandejani (2020)
IWF1	Easily interact with my classmates when using SNS	Removed
IWF2	Communicate effectively with my classmates through SNS	Retained
IWF3	Often share study materials with classmates via SNS	Retained
Interaction with Lecturers (IWL)		Adapted from Alaslani and Alandejani (2020)
IWL1	Easily communicate with instructors when using SNS.	Retained
IWL2	Find SNS an effective way to contact instructors	Retained
IWL3	Often share or receive study materials with instructors via SNS	Retained
Engagement through SNSs (ENG)		Adapted from Gallini and Moely (2003), So and Brush (2008)
ENG1	Feel more connected to classmates and instructors when using SNS	Removed after content overlap with IWF
ENG2	Develop a sense of cooperation through SNS	Retained but moved to combined interaction with friend – IWF
ENG3	Feel that my opinions are valued when using SNS	Retained but moved to combined interaction with friend – IWF
ENG4	Using SNSs has helped to release stress, update and share information	Removed
Cooperative Learning (CLN)		Adapted from Fonseca et al. (2014)
CLN1	Find cooperative learning through SNS effective	Retained
CLN2	Find learning through SNS more effective than face-to-face learning	Removed after cross-loading with SP/CLN
CLN3	Learn new skills and knowledge from other members through SNS	Retained
CLN4	Develop teamwork skills through group discussions on SNS	Retained
Student Performance (SP)		Adapted from Fonseca et al. (2014)
SP1	Using SNSs helped to improve my studying results	Retained
SP2	Using SNSs helped to get high results	Removed after cross-loading with SP/CLN
SP3	Using SNSs helped to connect with big learning communication	Retained
SP4	Using SNSs strengthened practical skills	Retained
Academic Motivation (ACM)		Adapted from Vallerand et al. (1992)
ACM1	Study because I enjoy learning new things	Retained
ACM2	Feel motivated to study because it will help my future career	Retained
ACM3	Work hard in my studies because achieving good results is important to me	Retained
ACM4	Study because it gives me a sense of personal satisfaction	Retained
ACM5	Put effort into my learning because I want to improve myself	Retained
Self-Regulated Learning (SRL)		Adapted from Shi et al. (2025)
SRL1	Be able to resolve difficulties that arise during the learning process	Retained
SRL2	Make plans to manage my study time effectively	Retained
SRL3	Actively reflect on and summarize my learning experiences	Retained

Table A2. Factor loadings and item wording

Item	Item wording	Outer loading
Combined Interaction with Friends (IWF)		
IWC2	Communicate effectively with my classmates through SNS	0.960
IWC3	Often share study materials with classmates via SNS	0.965
ESNS2	Develop a sense of cooperation through SNS	0.950
ESNS3	Feel that my opinions are valued when using SNS	0.975

Table A2 (cont.). Factor loadings and item wording

Item	Item wording	Outer loading
Interaction with Lecturers (IWL)		
IWL1	Easily communicate with instructors when using SNS	0.888
IWL2	Find SNS an effective way to contact instructors	0.882
IWL3	Often share or receive study materials with instructors via SNS	0.885
Cooperative Learning (CLN)		
CL1	Find cooperative learning through SNS effective	0.871
CL3	Learn new skills and knowledge from other members through SNS	0.859
CL4	Develop teamwork skills through group discussions on SNS	0.864
Student Performance (SP)		
SP1	Using SNSs helped to improve my studying results	0.898
SP3	Using SNSs helped to connect with big learning communication	0.856
SP4	Using SNSs strengthened practical skills	0.849
Academic Motivation (ACM)		
AM1	Study because I enjoy learning new things	0.867
AM2	Feel motivated to study because it will help my future career	0.881
AM3	Work hard in my studies because achieving good results is important to me	0.890
AM4	Study because it gives me a sense of personal satisfaction	0.890
AM5	Put effort into my learning because I want to improve myself	0.911
Self-Regulated Learning (SRL)		
SRL1	Be able to resolve difficulties that arise during the learning process	0.903
SRL2	Make plans to manage my study time effectively	0.911
SRL3	Actively reflect on and summarize my learning experiences	0.899