

The Effect of Social Networking Services (SNS) on the Academic Performance of Secondary and Higher Secondary Students in Bangladesh

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ABSTRACT

Grounded in a dual-pathway framework, this study investigates how social networking services (SNS) influence the academic performance of secondary and higher secondary students in Bangladesh. Specifically, the research evaluates the mediating roles of learning material utilization and SNS addiction, alongside the moderating effects of gender and educational level. Using a cross-sectional research design and stratified purposive sampling, data were gathered from students and examined through Partial Least Squares Structural Equation Modeling (PLS-SEM), with addictive behaviors measured via the Bergen Social Media Addiction Scale. The structural equation modeling results indicate that general SNS usage exerts no statistically significant direct effect on academic performance; rather, the relationship operates entirely through contrasting indirect paths, showing a significant positive mediation through learning material utilization and a significant negative mediation through SNS addiction. Furthermore, multigroup moderation analysis reveals that while gender does not significantly moderate the structural paths, educational level significantly moderates the relationship between learning material use and academic performance. These insights suggest that educational institutions and policymakers should design targeted digital literacy interventions that encourage the purposeful academic application of online platforms while proactively addressing addictive usage behaviors among students.

KEYWORDS: SNS, SNS addiction, learning Materials, Academic Performance, Gender, Level of education, Bangladesh

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1. Introduction

The proliferation of Social Networking Services (SNS) assists that let users in creating profiles, a repository of personal information, to connect with persons matching common backgrounds and experiences- has reshaped the social and communication landscape, particularly for adolescents and young adults (Alwagait et al., 2015; Hamilton et al., 2022). SNS examples include LinkedIn and Facebook (Messenger), YouTube, TikTok, Instagram, WhatsApp, Telegram, X (Twitter), IMO, etc. These platforms have become integral tools to communicate, share, participate, access information, and spend leisure time (Sánchez-Navarro & Aranda, 2013).

In Bangladesh, the increasing internet penetration has significantly contributed to the growing use of SNSs among students, mirroring the global trend (World Bank, 2023). The growing trend of mobile internet usage has initiated the integration of social networking services (SNS) in education. The schooling system in Bangladesh has experienced significant transformation in and after the COVID-19 pandemic. Students at the primary, secondary, and higher secondary levels during this timeframe experienced digital education initiatives through television.

Social networking services offer numerous benefits, including fostering social connections, providing access to information, and enhancing collaboration and communication. For students, SNS creates opportunities for sharing learning resources, enhancing interactions with peers and teachers, boosting e-knowledge sharing, and positively influencing engagement and academic performance. SNS tools can improve academic achievement, fostering greater creativity, motivation, and commitment to learning (Shabur & Siddiki, 2024). However, alongside these benefits, there are potential negative impacts of SNS usage. The excessive use of social networking services (SNS) for non-academic purposes has negative effects on students. Prolonged and habitual usage often reduces study time, distracts students, and lowers their concentration, ultimately harming academic performance. This behavior also affects social interactions, sleep, and physical health, increasing the risk of internet addiction (Kolhar et al., 2021). Certain research indicates that SNS consumes students' time and fosters internet addiction, subsequently resulting in diminished academic performance (Salari, Zarei, Rasoulpoor, et al., 2025).

Existing studies in Bangladesh have focused on university students, with limited attention given to secondary and higher secondary students. Moreover, these studies have largely focused on the direct association between SNS use and academic performance. This study addresses these gaps by examining the relationship between SNS use and academic performance among SSC and HSC students through mediators and moderators. The growing use of SNS among secondary and higher secondary students in Bangladesh offers both advantages and obstacles for academic life. Although these social networking services improve access to resources, connectivity, and collaboration, their excessive use raises concerns over their effects on students' academic performance. This study seeks to analyze the positive and negative effects of SNS usage on students' academic performance and help to develop solutions that improve student learning in the digital era.

This study attempts to investigate the role of social networking services (SNS) in students' academic performance, focusing on their intentions for use, levels of addiction, and academic performance. It

explores whether students use SNS primarily for academic support, investigates addiction level across SSC and HSC students by gender, and assesses how effectively SNS facilitates learning. The research also evaluates how the use of SNS for study materials and the degree of addiction relate to academic performance. In pursuit of these goals, the study raises several key research questions:

- i. What specific needs or objectives do students seek to fulfill through their use of social networking services?
- ii. Is there any difference in the SNS addiction level based on students' education level and gender?
- iii. Does SNS use facilitate the learning of academic content, particularly when analyzed by gender and level of education?
- iv. How does social media usage—both academically and addictively—affect overall student academic performance?

The section below provides an overview of the findings of other researchers. The third section outlines the theoretical framework & hypotheses. The next section depicts the methodology to examine the proposed hypotheses and the conceptual model. This is succeeded by an outline of the study's findings and an analysis of the results. The second-to-last section outlines both the theoretical and practical implications, while the concluding section examines the study's limitations and proposes future studies.

2. Literature Review and Hypotheses Development

2.1 SNS's Effect on Academic Performance

Over the past decades, SNSs have emerged as an essential aspect of daily life, particularly in digitally connected surroundings. These platforms, including Facebook, Instagram, X, TikTok, LinkedIn, and others, allow users to build personal profiles, interact with others, and increasingly serve as hubs for media sharing, link distribution, and online conversations.

Although students use social networking platforms for educational purposes and social interaction, these platforms have a considerable influence on their academic performance. Various research on this field from different countries shows that most of the time, the use of SNSs and academic performance are negatively correlated. (Liu et al., 2017; Paul et al., 2012; Rostaminezhad et al., 2019). Table 1 shows the literature summary of the related research papers from past decades and from different countries.

According to Doleck & Lajoie (2018) They investigated from a literature review of 23 peer-reviewed papers. From their literature-based study analysis, they found that most of the research reports (61%) show a negative correlation between SNS use and academic performance. Conversely, 35% of the studies found no significant relationship. About 4% of the research found a positive correlation, with social media usage associated with enhanced academic performance.

Huang (2018) conducted a meta-analysis to investigate the relationship between social networking site (SNS) use and academic achievement, synthesizing data from 30 studies comprising 21,367 participants. The overall results showed a somewhat negative relationship ($r = -.07$) between SNS use and academic performance. However, the strength of this relationship varied depending on the measurement of SNS use. Specifically, studies that focused solely on Facebook use showed a negligible correlation ($r = -.02$), while those that measured general SNS use showed a slightly stronger negative correlation ($r = -.12$). In terms of usage patterns, duration of SNS use had a small negative association with academic outcomes ($r = -.10$), whereas frequency of visits had an almost zero correlation ($r = -.01$). Huang's (2017) findings suggest that while there is a slight negative trend, the academic impact of SNS use is generally minimal and largely dependent on how usage is defined and measured. This analysis emphasizes the necessity of using nuanced approaches in evaluating the academic implications of social media use.

Tafesse (2020) researched 180 college students on how student engagement mediates the link between social networking site (SNS) usage and academic performance, addressing the limitations of previous studies that primarily examined only direct effects. The research involved students, who completed a questionnaire assessing their daily time spent on six major SNS platforms, their level of engagement using a ten-item scale, and their academic performance quantified by semester GPA. Using the PROCESS macro for mediation analysis, the study found that increased SNS use negatively affects academic performance by reducing student engagement. The findings emphasize the importance of student engagement as a key intermediary factor, providing a better understanding of how social media behaviors can indirectly affect academic performance.

Cheng et al. (2024) highlighted the effects of active social network usage (ASNU) and passive social network usage (PSNU) on academic performance. A survey conducted with a sample of 621 high school students in Taiwan revealed varying effects of Active Social Network Usage (ASNU) and Passive Social Network Usage (PSNU) on academic performance. While PSNU has no direct relationship with academic outcomes, ASNU can divert students' attention away from their studies, leading to a degradation of their academic outcomes.

Table 1: Literature summary of the related research paper

Author/s	Country	Level of education	Finding
Zhao (2023)	Chinese	College	Negative
Ansari & Khan, (2020)	India	University	Positive
Shabur & Siddiki, (2024)	Bangladesh	University	Positive
Shafiq & Parveen (2023)	Pakistan	University	Positive
Ali Homaid (2022)	Saudi Arabia	University	Negative
Hussain et al., (2024)	Pakistan	University	Positive
Doleck et al., (2019)	Quebec	College	No Relation
Rostaminezhad et al. (2019)	Iran	University	Negative
Doleck et al. (2019)	Canda	University	Positive
Al-Yafi et al. (2018)	Qatar	University	No Relation

2.2 SNS Addiction and Academic Performance

Zhao (2023) illustrates the adverse effects of Social Media Addiction (SMA) and how it influences the academic performance of 372 college students in China. The research indicates that overuse of social media results in SMA, which increases perceived stress—a factor known to hinder academic success. However, the previous research has not thoroughly investigated the mediating effect of stress on the relationship between SMA and academic performance. Zhao (2021) addresses this gap by developing a research model that examines how social media use intensity predicts SMA and reveals how both SMA and stress lead to a decrease in academic performance. In this study, stress acts as a mediator in the link between SMA and academic performance. SMA has a negative impact on academic achievement.

Ning & Inan (2024) examine the emotional and self-control facets of addiction to social media and how it impacts academic performance. A total of 251 college students took part in the research. Based on the dual-systems theory, an integrated model was developed and evaluated via partial least squares structural equation modeling, or PLS-SEM. The findings indicated that self-control is the mediating variable between students' GPA and social media addiction. Addiction to social media also exacerbated stress and anxiety, which weakened the beneficial relationship between academic achievement and self-control. These realizations give educators a starting point for creating treatments that tackle the problems caused by social media addiction.

The study conducted by Azizi et al. (2019) contributes to this growing body of literature by investigating the relationship between social networking addiction and academic performance among 360 medical students in Iran. The extent of SNS addiction and students' academic performance were shown to be negatively and statistically significantly correlated by the authors ($r = -0.210$, $p < 0.01$), implying that students' academic performance tends to worsen as their usage of social media increases to the point of addiction. According to Azizi et al. (2019), there is a negative relationship between SNS addiction and students' academic performance.

Salari, Zarei, Hosseini-Far, et al. (2025) conducted a comprehensive review and meta-analysis to examine the worldwide effects of social media addiction on university students' academic performance. By searching multiple databases with relevant keywords and carefully filtering the studies through screening, eligibility, and quality assessments, the researchers analysed the final selection using a random effects model. The findings revealed a significant negative correlation ($r = -0.172$) between addiction to social media and the academic performance of students, implying that extensive engagement with social networks impedes academic success.

2.3 Learning Materials Usage and Academic Performance

Ansari & Khan (2020) investigate how social media and mobile technologies contribute to improved collaborative learning and academic outcomes in India's higher education sector. The study emphasizes that employing social media for teamwork significantly enhances students' interactions with peers and faculty, facilitates online knowledge sharing, and strengthens overall student engagement. The literature highlights that collaborative learning via social media fosters greater interactivity and engagement. Structural equation modeling confirmed that all proposed

relationships were significant, with student engagement mediating the effects of social media-based collaboration on academic outcomes. The research indicates that utilizing online social media for collaborative learning enhances students' creativity, adaptability, and research skills, which in turn boosts their overall academic success.

Shafiq & Parveen (2023) examined the connection between knowledge sharing on social media and academic achievement. Students from 10 universities in Pakistan are divided into two classes, one of whom used social media and the other who did not. And tested almost 234 participants with structured questionnaires. Ultimately, it was discovered that the sharing of knowledge on social media enhances students' academic performance.

Shieh & Nasongkhla (2024) found that participation in social networking sites offers university students opportunities to develop critical thinking, media literacy, and personal growth. This study explored the relationship between students' incentives for utilizing social networking platforms, media proficiency, and analytical reasoning. Data were collected from 211 university students in Bangkok, Thailand, using three instruments. The findings revealed significant positive relationships: students motivated to use social networks showed better media literacy, critical thinking, and reflection skills. Additionally, improved media literacy was linked to better multimedia organization and analysis. These results emphasize the importance of social networking services in boosting students' learning and analytical capabilities.

Wong & Liu (2024) demonstrated that social networking sites (SNS) have transformed how international students build essential connections for their studies abroad, friendships, and adaptation, using a lens of an Online Community of Practice (OCOP). They conducted comprehensive interviews with 18 international students from a Malaysian university to gather data. The researchers emphasized how the study enhances comprehension of how social networking sites (SNS) can be integrated into the development of a culturally secure learning environment that fosters friendships and supports cross-cultural adjustment. Online communities, particularly those on social networking services (SNS), enhance international students' socialization and adaptation.

Shabur & Siddiki (2024) conducted a study involving 350 university students in Bangladesh and discovered that social media and smart device usage positively contribute to interactive learning. Engaging in online group activities strengthened communication with peers and instructors while encouraging the exchange of knowledge. These collaborative interactions significantly boosted student engagement, which subsequently improved academic performance. The study emphasizes that platforms such as Facebook, YouTube, and Twitter play a vital role in promoting students' creativity, motivation, and dedication to academic pursuits.

3. Theoretical Framework and Hypothesis

Academic performance reflects student achievement measured through total grade point averages (CGPAs), including cognitive and non-cognitive elements, and the level of academic skills achieved at the end of the educational period (Wuet al., 2024). It can be affected by a lot of factors, such as psychological, social media usage (Masnan et al., 2025), demographic, economic, and emotional attachment (Martín-Bozas et al., 2025). When students use social networking sites to perform

academic activities, share knowledge, continue studying at home, ask professionals, and review answers to their questions, it also facilitates a collaborative learning environment for both teachers and students, resulting in an improvement in their academic achievement. (Shafiq & Parveen, 2023).

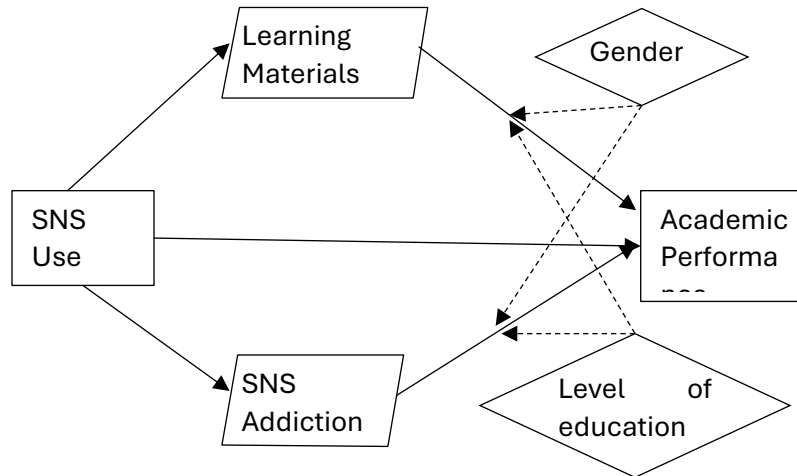


Figure 1: Theoretical Framework

3.1 Social Networking Services (SNSs)

SNSs are services that let users create profiles to connect with others, including friends who share similar interests or experiences. A user's personal information is stored and found in their profile. SNSs give users a variety of ways to communicate with each other. SNS examples include LinkedIn and Facebook (Alwagait et al., 2015). There are more SNS widely used today, which include YouTube, TikTok, Instagram, WhatsApp, Telegram, etc. Online lectures can be delivered using social networking services. Advantages of SNS use are favorably connected to academic performance (Doleck et al., 2019). Therefore, the following hypothesis is postulated:

H1: SNS usage positively impacts Academic performance.

SNS platforms offer a variety of study options, including the ability to keep presentations and educational resources for future use, cooperative learning, content sharing, teacher question-answering flexibility, and supportive learning at home (Aduba & Mayowa-Adebara, 2022; Demir, 2024; Warden et al., 2024). Consequently, the subsequent hypothesis is proposed:

H2: SNS usage positively impacts Learning Materials usage.

Overuse of social networking sites may result in symptoms that are often linked to addictions, according to mounting scientific data (Andreassen, 2015; Sun & Zhang, 2021). It can be determined by over screen time, obsessive checking, and negative effects on real-life relationships and obligations (Amirthalingam & Khera, 2024). Consequently, the subsequent hypothesis is proposed:

H3: Use of SNS increases social networking service addiction.

3.2 SNS Addiction

Social networking addiction is the term used to characterise mental health conditions associated with social media use and time spent on these platforms that disrupt people's other social activities, such as work and professional activities, relationships with others, and health, causing disruptions in their lives (Azizi et al., 2019). One instrument for assessing the addiction level of social media among young people is the Bergen Social Media Addiction Scale (BSMAS) (Gomez et al., 2024). There is an adverse association between social media addiction and academic performance; academic performance declines as social media addiction rises (Salari, Zarei, Rasoulpoor, et al., 2025). Addiction to social media lowers self-esteem, which is an element of improving academic performance, and increases depression, anxiety, and stress, all of which have a negative impact on academic performance (Landa-Blanco et al., 2024; Ning & Inan, 2024). Many researchers have found that social media addiction has a significant negative effect on academic performance. Therefore, the subsequent hypotheses are proposed:

H4: Social Media Addiction has a negative effect on Academic Performance.

H5: Social Media Addiction mediates the relationship between SNS use and Academic Performance.

3.3 Learning Materials Usage (LMU)

The use of social media as an instrument of sharing learning materials means to facilitate and improve learning by allowing for the interaction and sharing of scholarly information between experts and students. These platforms serve as informal channels yet effective educational tools where learners share resources, learning materials, communicate, and engage with groups and communities in ways that complement formal education (Al-Rahmi & Zeki, 2017; Kumar & Nanda, 2024). With SNS, students can easily collaborate with their mates and teachers, access study materials, understand study topics, and find ease of use (Mugahed Al Rahmi et al., 2014). All of these factors measure the effectiveness of social networking services as study materials. When student find SNS as a useful material, their academic performance increases (Ansari & Khan, 2020; S. Liu et al., 2022; Sabah, 2023; Shabur & Siddiki, 2024). Therefore, we postulate the following hypotheses:

H6: Learning Materials usage positively impacts academic performance.

H7: Learning Materials mediate the relationship between SNS use and Academic Performance.

3.4 Moderating Effects of Level of Education and Gender

We have already identified an association between the utilization of social networking sites (SNS) and learning materials, as well as between SNS use and SNS addiction. According to Perrin (2015), students at the graduate or college level use social media the most, followed by college-level students, while high school students tend to use it less or at a moderate level. This suggests that changing the educational level is related to the variations in the extent of SNS use. Consequently, this variation may influence the strength of the association between SNS usage and learning

materials usage, SNS use and SNS addiction, or both. Therefore, the subsequent hypotheses are postulated:

H8: The level of education moderates the relationship between learning materials usage and academic performance.

H9: The level of education moderates the relationship between SNS addiction and academic performance.

Compared to male students, female students have a high tendency to use social networking sites (Theophilou et al., 2024). Although male students access these platforms more frequently, female students are likely to spend more time on them. Even if male students exhibit higher levels of social media addiction, social media use seems to have a greater favorable impact on female students' academic performance. Therefore, the subsequent hypotheses are postulated:

H10: Gender has a significant moderating role in the relationship between SNS addiction and academic performance.

In terms of interaction, male students are more active in creating content and posts, while female students predominantly engage by visiting their peers' profiles. Additionally, male students are more inclined to exchange academic resources, have more favorable attitudes toward technology, and have more social media experience overall. Therefore, the following hypotheses are proposed:

H11: The relationship between learning materials Usage and academic performance is significantly moderated by gender.

4. Research Design and Methods

4.1 The Target Population and Sample

The target population for this study comprised students at the secondary and higher secondary levels from all educational boards in Bangladesh. We obtained data from both online and offline sources. We used the stratified purposive sampling technique, as it assures representation of all groups in the population needed. We provided printed questionnaires written in Bangla to the Dhaka, Dinajpur, Chattogram, Comilla, and Barisal boards and shared a Google Form with other educational boards. A total of 394 responses were initially collected. After data screening, 69 responses were excluded because of incomplete questionnaires and poor response quality, including straight-lining. Consequently, 325 valid responses were retained for the final analysis.

4.1.2 Data Analysis

The proposed model and the connections between the postulated constructs were tested and validated using the Partial Least Squares (PLS) method, a statistical analysis approach based on the Structural Equation Modelling (SEM). SAM is a commonly used paradigm for evaluating the viability of theories based on empirical data. The data was analyzed using SmartPLS software, one of the popular PLS-SEM software programs. Microsoft Excel was used to record survey data, which was then imported into SmartPLS software for statistical analysis.

4.1.3 Ethical Statement

At present, no Institutional Review Board (IRB) or equivalent ethics committee exists at our institution or in our local research context; therefore, it was not possible to obtain a formal IRB certificate. However, the study was conducted in line with ethical standards: participants gave informed consent, their responses were anonymous and confidential, and the survey involved minimal risk.

5. Data Analysis and Findings

5.1 Demographic Characteristics of Sample

Data was collected from SSC and HSC-level students. As shown in Table 2's demographic data, 28% of participants are male students at the SSC level, and 21% are male students at the HSC level.

Table 2: Participants' Descriptions (n=325)

Level	Gender	Frequency	Gender Percentage	Level Total
HSC	Female	66	20%	133 (41%)
	Male	67	21%	
SSC	Female	102	31%	192 (59%)
	Male	90	28%	
Total		325	100%	325 (100%)

Additionally, 31% of the respondents were female students from the SSC level, and 20% were from the HSC level. Overall, a greater proportion of respondents (59%) belonged to the SSC level. This sampling approach aligns with existing educational statistics (BANBEIS, 2024), which consistently show a higher number of SSC students compared to HSC students. Therefore, a larger portion of the sample was intentionally drawn from the SSC level to ensure appropriate representation.

5.2 Measurement Model Assessment

Cronbach's alpha (CA) and composite reliability (CR) were used to measure internal consistency in order to assess the data's reliability. Table 3 and Figure 2 display that the constructs of the study have a composite reliability of between 0.69 and 0.83, which is higher than or very close to the minimum reliability of 0.7 (Hair et al., 2021). To increase the internal reliability and consistency, we removed A4 (I feel compelled to use SNS more frequently) and A5 (I utilize SNS to block out personal issues).

Table 3: Convergent Validity and Internal Reliability

Constructs	Items	Factor Loading	Cronbach's Alpha (CA)	Composite Reliability (CR)	Average Variance Extracted (AVE)
Academic Performance (ACP)	P1	0.50	0.21	0.69	0.55
	P2	0.92			
Learning Materials Usage (LMU)	M1	0.73	0.70	0.81	0.52
	M2	0.75			
	M3	0.61			

Constructs	Items	Factor Loading	Cronbach's Alpha (CA)	Composite Reliability (CR)	Average Variance Extracted (AVE)
SNS Addiction (SAD)	M4	0.77	0.75	0.83	0.56
	A1	0.76			
	A2	0.81			
	A3	0.54			
	A6	0.85			
SNS Use (SU)	U1	0.76	0.37	0.76	0.61
	U2	0.81			

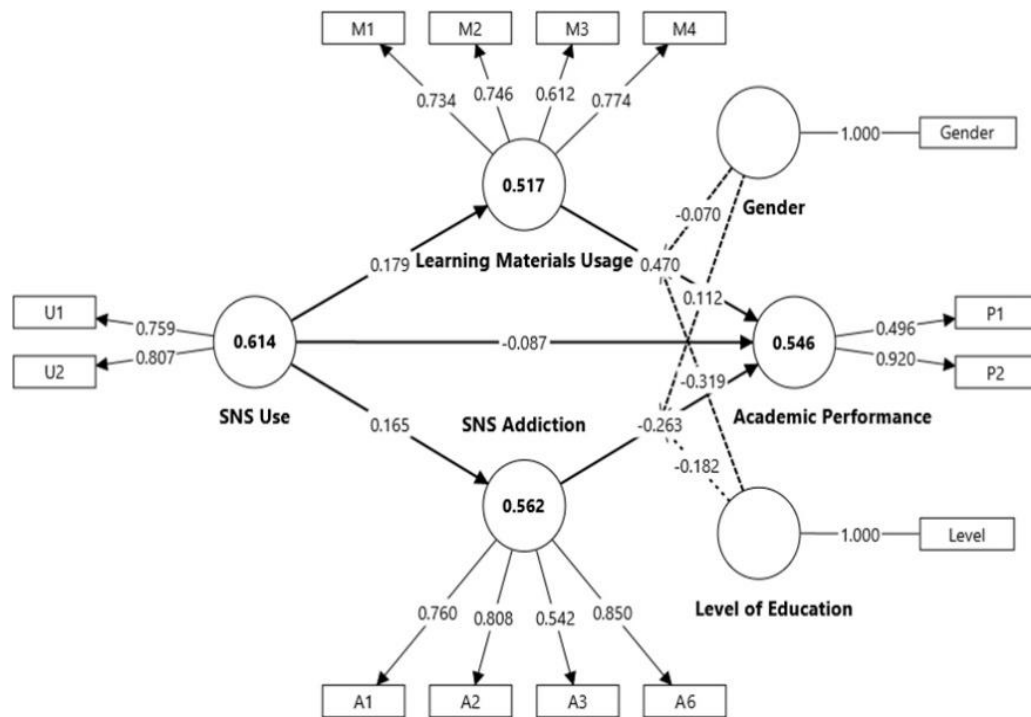


Figure 2: Factor loading of the Constructs

According to Henseler et al., (2016) the cut-off of 0.7 is often recommended, but it may not be strictly applicable in exploratory research. Therefore, values below 0.7 can be retained if they are reasonable. We have measured Academic Performance (ACP) through GPA and students' opinions about the effect of SNS use on their academic performance.

We have to combine GPA and opinion because Bangladeshi schools and colleges don't follow a similar marking system. Moreover, GPA based on location may vary. Moreover, school students in our country are not familiar with surveys and have limited knowledge of how to answer survey questions. For that reason, there might be low internal consistency (CA = 0.21). In this case, while the factor loadings are below 0.7, they remain above 0.6, indicating that they still meaningfully represent the underlying construct and are acceptable for exploratory purposes. The model looks strong but theoretically compromised when some indicators are eliminated because doing so could improve

AVE and composite reliability. Thus, the results demonstrated that every factor in the measurement model has sufficient reliability.

According to the measurement model in Table 3, the AVE varied between 0.52 and 0.61. The convergent validity was strong because all AVE values were greater than 0.5. Consequently, the convergent validity requirement's conditions were upheld.

Table 4: Correlation Matrix

Constructs	ACP	Gender	LMU	Level	SAD	SU
ACP	1					
Gender	-0.041	1				
LMU	0.281	0.069	1			
Level	-0.308	0.034	0.161	1		
SAD	-0.328	0.144	0.002	0.219	1	
SU	-0.133	0.237	0.179	0.287	0.165	1

Table 4 presents the correlation coefficients among the variables used in the study. The strongest positive correlation was observed between Learning Materials Used (LMU) and Academic Performance (ACP) ($r = 0.28$), indicating a moderate positive association between the two variables. Conversely, Social Media Addiction (SAD) demonstrated a relatively strong negative correlation with Academic Performance ($r = -0.33$), suggesting that increased levels of addiction are linked to lower academic performance. All intercorrelation values are significantly below the threshold of 0.683, signifying no evidence of multicollinearity concerns. The maximum correlation recorded is 0.281, and the minimum is -0.041. The results indicate that the variables are adequately different, validating the model's suitability for additional structural investigation.

5.3 Structural model

5.3.1 Hypothesis Testing

The structural paths, endogenous variable P-value, and explanatory power of the structural model were all examined using Smart PLS 4.0. The hypothesized relationship was tested using the bootstrapping method at a threshold for significance of 0.05 ($p < 0.05$). (Efron & Tibshirani, 1994). At this point, the study uses t-statistics and the path coefficient (β) to test the proposed relationship between the independent and dependent variables at an accepted level of significance of 0.05 ($p < 0.05$).

Table 5: Results of the Hypotheses Testing

Hypothesis	Constructs' Relationship	Std. Beta	T-values	P-values	Decision
H1	SU -> ACP	-0.02	0.16	0.87	Not Supported
H2	SU -> LMU	0.18	2.81	0.01	Supported
H3	SU -> SAD	0.16	2.58	0.01	Supported
H4	SAD -> ACP	-0.27	3.16	0.00	Supported
H5	SU -> SAD -> ACP	-0.043	1.977	0.048	Supported

Hypothesis	Constructs' Relationship	Std. Beta	T-values	P-values	Decision
H6	LMU -> ACP	0.45	6.80	0.00	Supported
H7	SU -> LMU -> ACP	0.084	2.517	0.012	Supported

The PLS results of the hypothesis tests are presented in Table 5. The results show that the relationships between SNS Use (SU) and Learning Materials Usage (LMU) ($t = 2.81$, $\beta = 0.18$, $p = 0.01$), SNS Use (SU) and SNS Addiction (SAD) ($t = 2.58$, $\beta = 0.16$, $p = 0.01$), SNS Addiction (SAD) and Academic Performance (ACP) ($t = 3.16$, $\beta = -0.27$, $p = 0.00$), Learning Materials Usage (LMU) and Academic Performance (ACP) ($t = 6.80$, $\beta = 0.45$, $p = 0.00$) were significant. Thus, H2, H3, H4, & H5 were supported. However, surprisingly, the relationship between SNS Use (SU) and Academic Performance (ACP) ($t = 0.16$, $\beta = -0.02$, $p = 0.87$) was insignificant. Thus, in this study, H1 was not supported at the $p > 0.05$ level.

5.3.2 Mediating effect of Learning Materials Usage & SNS Addiction

Mediation analysis was performed to assess the mediating role of SAD and LMU in the relationship between SU and ACP. Table 5 shows findings of a significant indirect influence of SU on ACP through SAD. SU has an indirect influence on ACP through SAD ($t = 1.977$, $\beta = -0.043$, $p < 0.048$). SU has an indirect influence on ACP through LMU ($t = 2.517$, $\beta = 0.084$, $p < 0.012$).

5.3.3 Moderating effect of Level of education & Gender

We applied PLS-MGA, a one-tailed test, to investigate whether gender and education level moderate the relationships between SNS addiction, learning materials usage, and academic performance. Table 6 shows the result. According to Hair et al., (2018), a significant difference is present if the p -value is $p \leq 0.05$ (or $1-p \leq 0.05$ for the reverse direction).

Table 6: PLS-MGA Results for the moderating role of Gender & Education Level

Hypothesis	Relationship	β diff (Female vs Male)	p value (Female vs Male)	Decision
H8	LMU -> ACP	0.427	0.002	Supported
H9	SAD -> ACP	0.242	0.107	Not Supported
		β diff (SSC - HSC)	p value (SSC vs HSC)	
H10	SAD -> ACP	-0.081	0.726	Not Supported
H11	LMU -> ACP	0.115	0.152	Not Supported

Education level appears to play a more critical role. The path from Learning Materials Usage to Academic Performance shows a significant difference between SSC and HSC students (β diff = 0.427; $p = 0.002$). This means that students' academic level significantly influences how much learning materials impact their academic outcomes. The relationship is notably stronger for one group, implying that SSC and HSC students benefit differently from the use of learning resources. So, H8 is supported.

However, the influence of SNS Addiction on Academic Performance does not significantly differ between SSC and HSC groups (β diff = 0.242; $p = 0.107$). Therefore, education level does not

moderate this particular relationship. Therefore, H9 is not supported. Our findings also show no statistically significant differences between male and female students in how SNS addiction (β diff = -0.081 ; $p = 0.726$) or learning material usage (β diff = 0.115 ; $p = 0.152$) affects academic performance. This suggests that gender does not meaningfully alter the impact of these variables. Therefore, H10 and H11 are not supported.

5. Discussion

The primary objective of this research is to find the impact of SNS on the academic performance of secondary and higher secondary students in the context of Bangladesh. Figure 1 illustrates the theoretical model, created by the authors, clearly depicting the relation between SNS use and Academic performance mediated by Learning Material Usage and SNS Addiction, and also moderated by Gender as well as Level of Education.

The study first explored what specific needs or objectives students seek to fulfill through their use of SNS. The findings show that SNS usage significantly increases students' access to academic resources and study groups, facilitates communication among peers and teachers, and makes students happy to learn new things. This is confirmed by H2, that SNS usage positively influences learning material usage. Therefore, this finding is similar to the research by Sabah (2023) and Kumar & Nanda (2024), suggesting that integrating social media into learning environments positively influences knowledge sharing and increases student satisfaction.

However, H1 predicates a direct positive effect of SNS usage on students' academic performance, which is not supported. This direct effect is insignificant, indicating that the use of social networking services are neither necessarily positive nor negative for students' academic outcomes. Rather, the influence of these platforms appears that students' use of these platforms is the determining factor here. A study conducted by Tafesse (2020) found a negative association between social networking services use and students' academic performance while Huang (2018) performed a meta-analysis and found that the overall association between SNS use and academic achievement is relatively weak and highly dependent on how SNS usage is measured and operationalized. These research findings together suggest that the positive academic experiences that can come from using SNS can potentially be undermined by the distraction and time displacement factors that can arise from excessive use. But it's not just enough to talk about SNS usage, it should also be taken into account how students use SNSs in order to predict their academic performance.

An important theoretical insight from this research is the findings of indirect-only (full) mediation. SNS use it significantly affected the academic performances through Learning Materials Usage and SNS Addiction, but it didn't affect the academic outcomes. The results, therefore, indicate that SNS usage influences academic performance only through the activity created by the use of social network services rather than through mere exposure to social networking platforms.

The study further examined whether gender and educational level significantly affect the prevalence of SNS addiction. Supporting H3, the results indicate that the more students use SNS, the more likely they are to develop addictive usage patterns. The results also support H4, indicating that SNS addiction negatively impacts academic performance, which is consistent with prior research demonstrating that students' academic performance is significantly harmed by SNS addiction (Azizi et al., 2019; Landa-Blanco et al., 2024; Ning & Inan, 2024;). However, the effect did not significantly

vary, not supporting H9 and H10, between their levels of education or between genders. This suggests the importance of monitoring user behavior regardless of their level of education and gender.

Contrary to H9, gender did not significantly moderate the relationships between SNS Addiction and Academic Performance but supported H8. This finding suggests that the result of using addictive SNSs on a day-to-day basis could be a more genderless phenomenon among the modern students. Because of widespread access to digital tools and the internet, male and female students seem to come up with similar usage of SNS. But H8 indicates that the relationship between Learning Materials Use and Academic Performance varies between male and female. This finding is in contrast with Theophilou et al. (2024), who found that there were some gender-related differences in the ways in which social media are used, but that this does not necessarily impact learning outcomes.

Moreover, the study also investigates whether SNS use facilitates the learning of academic content, particularly when analyzed by gender and level of education. The results, supporting H6 and H2, indicate that the use of Social Networking Services (SNS) for accessing learning materials contributes positively to academic performance. However, male and female students benefit similarly, not supporting H11, from academic SNS use. On the other hand, results show that the level of education moderates the effect of learning materials usage, supporting H8 on academic performance. This suggests that HSC and SSC students may differ in how effectively they utilize SNS content for academic understanding. The reasons for this kind of different usage behavior of SNS between HSC and SSC students can be student age, different usage experience, availability of content, and device ownership with internet connectivity. Higher-level students are more academically mature in some respects and more digitally literate and able to self-regulate their learning, which means they can make use of online learning resources better. Previous research has indicated that learners who are better self-regulators and are more self-directed learners are able to receive more educational benefits from digital learning environments (Broadbent & Poon, 2015). Therefore, the effectiveness of SNS as a learning tool may be higher when the students embrace higher levels of education.

The magnitude of the path coefficients further highlights the relative importance of the examined mechanisms. The effect of Learning Materials Usage was the most positive ($\beta = 0.45$) and comparatively negative ($\beta = -0.27$) when compared to that of SNS Addiction and Academic Performance, respectively. These findings indicate that educational involvement of SNS has a greater relationship with academic achievement than addiction has with academic failures. Thus, the beneficial outcomes of students' SNS use can exceed the risks of use when students practice positive and learning-oriented SNS usage. The findings are also supported by Ansari and Khan (2020), who found that collaborative learning activities facilitated through social media significantly enhance student engagement and academic achievement.

From a bird's-eye view, these findings show that SNS functions as a double-edge educational technology. On one hand, SNS acts as a learning resource as noted in (Greenhow, 2011; Kolokytha et al., 2015; Popescu, 2014), and increased use of SNS for learning materials is positively correlated with academic performance as provided by Alaslani & Alandejani, (2020) and Al-Rahmi & Zeki, (2017). The findings are congruent with our H7, which is that the use of learning materials is found to mediate the relationship between SNS usage and academic performance. However, in line with the

studies linking SNS use to SNS addiction (Kuss & Griffiths, 2017; Marengo et al., 2022; Zhao, 2021), our results supported H5, which is the negative mediation that we assumed between SNS use and academic performance. This actually indicates the dual role of SNS. Consequently, educational institutions should focus on promoting purposeful and academically oriented SNS usage while discouraging excessive and compulsive engagement.

However, and in line with the studies related to SNS use and academic performance highlighted by Marengo et al. (2022), our results supported the negative mediation (H5) that we assumed between SNS use and academic performance, mediated by SNS Addiction (Kuss & Griffiths, 2017; Zhao, 2021).

The results of this study should be interpreted within the Bangladeshi educational context, where reliance on digital technologies and social networking platforms increased substantially during COVID-19 pandemic in Bangladesh. Smartphones and the internet have become commonplace, making SNS, like Facebook, YouTube, and Messenger, among the crucial informal learning platforms, also for secondary and higher secondary level students. Therefore, it is possible that this is because the usage of learning materials was a better predictor of academic performance in this study than SNS addiction.

6. Conclusion

The purpose of our research is to explore the dual impact of Social Networking Services (SNS) on the academic performance of secondary and higher secondary students in Bangladesh. The findings reveal that SNS Use does not directly influence students' Academic Performance; instead, its effect is mediated by two key factors, Learning Materials Usage and SNS Addiction. While the academic use of SNS through sharing and accessing learning materials positively influences academic performance, excessive and non-academic use contributes to distraction and decreased performance. These dual outcomes emphasize that SNS can serve as both a supportive learning tool and a source of academic disruption, depending on how students engage with it.

6.1 Implications

This study addresses multiple theoretical gaps and offers several important contributions to the existing research on social networking services (SNS) and students' academic performance. First, it extends the limited body of research on the impact of SNS use on students' academic results by focusing specifically on secondary and higher secondary students—a demographic that has received minimal attention in existing studies, which are predominantly centered around university-level learners. This demographic shift adds new empirical insight into how adolescent students interact with SNS in academic contexts.

Second, this study contributes by empirically assessing the mediating roles of Learning Materials Usage and the mediating roles of SNS Addiction in the relationship between SNS Use and Academic Performance. While prior studies have acknowledged the positive and negative effects of SNS in isolation, few have examined how and through which pathways these effects are transmitted. Our findings demonstrate that SNS use influences academic performance both positively when it enhances access to learning resources, and negatively when it fosters addictive behaviors.

Third, no previous empirical study has examined at Learning Materials Usage and SNS Addiction as parallel mediators within a single model correlating SNS Use and Academic Performance, as far as the authors are aware, and based on a comprehensive review of peer-reviewed databases.

Although existing literature suggests that using Social Networking Services for academic purposes can improve performance, and excessive SNS use can hinder it, these factors have typically been treated as independent variables rather than explanatory mechanisms. By integrating them as mediators, this study provides a more sophisticated comprehension of SNS's dual nature and how it can simultaneously serve as a tool for learning and a source of distraction. Finally, we have included Gender and Level of Education as two moderating variables. Several researchers have considered Gender as a moderating variable in the relationship between SNS Use and Academic Performance. But in our study, we have identified that the Level of Education (SSC & HSC) also plays an important moderating role in the relationship between SNS Use and Academic Performance, mediated by Learning Materials Use and SNS addiction.

Our research offers valuable insights for teaching professionals, legislators, school administrators, and guardians concerned with students' academic performance in the digital era. The findings indicate that, whereas social networking services (SNS) can enhance academic performance by facilitating the sharing of learning materials, they may also detrimentally impact performance when they result in excessive or addictive usage. Consequently, educational institutions and authorities ought to implement programs that foster the academic utilization of social networking platforms by incorporating organized digital learning settings that direct students towards constructive engagement.

Institutions might contemplate implementing training programs for both students and educators on the utilization of social networking services for academic cooperation, resource sharing, and information exchange. Simultaneously, awareness efforts must be executed to inform students and parents about the dangers of Social

Networking Services (SNS) addiction and how it affects academic performance. Educational institutions can facilitate regulated access to academic social networking groups and platforms, ensuring that students interact with pertinent content while reducing distractions.

Additionally, educational authorities might implement digital well-being recommendations in the national curriculum to foster responsible digital conduct. By collaborating, educational institutions and families can achieve a balance between the advantages and hazards of social networking service usage, optimizing its utility as a learning instrument while alleviating its possible detriments.

6.2 Limitations and Future Research Directions

Despite its contributions, there are some limitations. First, the research focused solely on the secondary and higher secondary students in Bangladesh, which may limit the findings' applicability to different countries. Second, we focused on collecting data from the education boards, but we didn't collect data from all the schools and colleges around the country. So, if a further study is conducted with samples from each school and college, there might be a different picture.

Third, the study used a fixed set of constructs and did not include psychological or contextual factors such as motivation, peer influence, or parental control, which may also shape SNS usage behavior and academic performance.

For future research, it is recommended to expand the sample to include students from various regions and educational backgrounds across Bangladesh to enhance generalizability. A longitudinal design would also provide deeper insight into the causal correlation between SNS Use and Academic Performance over time.

Future studies may consider incorporating other moderating variables such as digital literacy, socio-economic status, or school policies regarding technology use. Lastly, a study may be conducted in the future considering the students from all the educational levels, including primary, secondary, higher-secondary, and university-level students.

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Declaration of Competing Interest

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Data availability statement

The dataset linked to this investigation will be available upon request.

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