Original Article

From Connectivity to Cognition: Analyzing the Effectiveness Social Media in E-learning Practices of High School Students in Cooch Behar District

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Abstract

Social media's explosive expansion has changed the face of education by creating new avenues for interaction, cooperation, and learning. With an emphasis on its effects on academic performance, learning engagement, and cognitive outcomes like critical thinking, problem-solving, and retention, this study investigates how well high school students in the Cooch Behar district use social media in their e-learning practices. Using a quantitative research approach, the study used a structured questionnaire that was given to 120 students and covered learning objectives, social media connectivity intensity, and demographic information. Regression analysis was used to examine the affects of social media use on learning engagement and academic performance, frequency and percentage distributions for demographic variables, and correlation analysis to investigate the relationship between social media connectivity and cognitive outcomes. The results showed that while connectivity showed a strong positive link with students' cognitive ability, social media usage significantly effects academic performance and learner engagement, accounting for approximately half of the variance seen. These findings demonstrate social media's increasing value as a teaching aid that fosters dynamic, resource-rich learning settings. The study concludes that social media use that is directed and intentional can improve student achievements, but it also highlights the necessity to balance social media use to prevent distractions.

Keywords: *Social media, E-learning, Academic performance, Learning engagement, Social media connectivity, High school students*

Introduction

Social media has proven to be a useful tool in e-learning practices, with various studies and papers showing its benefits and the ways it enhances the educational experience for both students and instructors.

Social media platforms establish very communicative and cooperative learning systems that can surpass the boundaries of traditional classrooms. Discussion groups, group chats, live streams, and real-time question and answers will expose learners to more fun and inclusive activities. These characteristics grant pupils with a chance to express their views, ideas and clear their doubts in real time. The participation that has the voice of even the students who otherwise feel shy about engaging in classroom discussions is encouraging and more receptive through social media. With this kind of incremented engagement, active participation and enhanced community feelings among learners and instructors are fostered. (Jain, 2025), (Elearning, 2024)

Ease and speed of communication is one of the most important tools to e-learning through social media. The students and teachers need not turn to official class time to exchange information, provide feedbacks, and answer queries; they can do them anytime. The social media makes learning more effective because critical academic information, reminders, and materials are not posted any later than an urgent need arises. Such timely communication creates the environment of consistency in the learning process, enhances the teacher-student relationship and eliminates the possibility of failure to communicate.

Social media has provided learners with access to various sources of learning material which are user friendly in relation to their learning style. Videos, podcasts, infographics, expert talks, international study groups, all these can be found easily on the various platforms.

The content is rich with this variety to prompt that, learners are not restricted on textbooks or classroom lectures only but have a chance to review various angles on the topic. Moreover, there is the possibility of interaction with students and experts all around the world making them enrich their knowledge and widen their worldviews. **(Mok, 2024), (Elearning, 2024)**

Studies indicate that integration of social media tools in e-learning can affect the students' motivation and their confidence in their academic performance. The possibility to exchange success, get the immediate support of colleagues and the tutor, participate in the elements of the game learning process also helps to feel the increased fulfilment. Students also have more choices in managing their learning, and it builds confidence in these students in their abilities. This increases self-efficacy, which keeps them motivated and lowers dropout rates and helps retain active interest in learning throughout their lives. **(Hu et al., 2024), (Sobaih et al., 2022)**

The social media gives students the freedom to study at a comfortable pace and time. Students can use recorded sessions, join like minded communities and get recommendations based on their preference. This flexibility is especially ideal to remote students, working adults or generally a student with many things to attend to. Individualized learning opportunities enabled by the power of social media algorithms as well as interactivity of groups of people make learning not only accessible but personalized. **(Jain, 2025), (Elearning, 2024)**

Social media in e-learning also enables one to develop necessary digital skills. Students are educated on the knowledge of how to create and maintain online profiles, communicate professionally and observe the right internet etiquette. Such proficiencies are becoming more and more important in the contemporary digitalized world, where knowledge of the Internet and digital skills is critically associated with academic, work and social achievements..**(Elearning, 2024)**

Objectives

1. To examine the impact of social media usage on the academic performance and learning engagement of high school students in the district of Cooch Behar.
2. To analyze the relationship between the intensity of social media connectivity and students' cognitive outcomes, such as critical thinking, problem solving and retention.

Hypothesis

1. **H_0 (Null Hypothesis):** Use of social media has no significant role on the academic performance and learning engagement of high school students in the district of Cooch Behar.
2. **H1(Alternative Hypothesis):** Social media usage has a significant impact on the academic performance and learning engagement of high school students in the district of Cooch Behar.
3. **H0(Null Hypothesis):** The potential of social media connectivity is not significantly related to students' cognitive outcomes such as critical thinking, problem solving and retention.
4. **H2 (Alternative Hypothesis):** The concentration of social media connectivity is significantly related to students' cognitive outcomes such as problem solving, abstract thinking and retention of knowledge.

Literature Review

(Hassan et al., 2025) This study examined the barriers to e-learning adoption among Saudi Arabian students in higher education institutions via social media and suggested solutions. There were 400 participants in the study, comprising students, academics, administrators, lawmakers, and business professionals; 328 of the replies were valid, representing an 82% response rate. To gather both quantitative and qualitative data, a mixed-methods approach was used, combining semi-structured interviews with structured internet questionnaires. Key impediments were identified by the findings, which included legislative limitations brought on by censorship regulations and data protection laws, cultural limitations including gender segregation and traditional attitudes, and poor technology infrastructure. Divergent opinions regarding social media's function in e-learning admissions were also voiced by stakeholders. Participants acknowledged its potential to increase accessibility and engagement in spite of these challenges. To improve social media integration in e-learning admissions, recommendations focused on bolstering infrastructure, encouraging diversity, guaranteeing regulatory compliance, offering training opportunities, encouraging stakeholders' collaboration and funding continued research.

(Salloum et al., 2020) The acceptability of e-learning systems by students utilizing the platforms of higher education institutions (HEIs) has been the subject of numerous longitudinal studies. However, little is known about the examination of the factors influencing the adoption of e-learning at HEIs through social media applications. Accordingly, by adding these variables to the technology acceptance model(TAM), the current study aims to comprehend how social media practices that is, knowledge sharing, social media features, motivation and uses affect students' adoption of e-learning systems. Using questionnaire surveys, 410 graduate and undergraduate students from the British University in Dubai, United Arab Emirates participated in the study. The expanded model is analyzed using partial least squares-structural equation modelling (PLS-SEM). Perceived usefulness (PU) and perceived ease of use (PEOU) are significantly improved by social media behaviours, such as information sharing, social media features, motivation and uses, according to the empirical data analysis. It is also necessary to note that both PU and PEOU have a major impact on the adoption of e-learning systems. In conclusion, social media usage has a significant favourable impact on students' acceptance of e-learning platforms.

(Mnkandla & Minnaar, 2017) Distance learning in higher education as we know it is coming to an end with the use of social media in e-learning. It seems to have little effect on the operations of open and distance learning (ODL) institutions, nevertheless. A substantial portion of the explanation for the sluggish adoption of social media in e-

learning, according to a previous study, may not be related to the typical characteristics associated with distance learning reforms. This study made use of the higher education online collaborative learning (OCL) conceptual framework. Social media platforms, including blogs, wikis, Facebook, Skype, Google Hangouts and even mobile apps like WhatsApp, have the potential to support deep learning and knowledge creation in higher education through e-learning. This meta-synthesis presents an interpretive integration of peer-reviewed qualitative research findings on social media in e-learning. Social media in e-learning is examined through a synthesis of data, research techniques and theories. Out of the data, seven themes surfaced and the resulting framework for social media in e-learning was developed. The suggested framework might be helpful to academics and instructional designers who wish to employ social media as a deep learning method in higher education e-learning are interested in using contemporary learning theories.

(Moghavvemi et al., 2017) In the area of information systems, there is comparatively little research on the use of social networks for teaching and learning. Studying how social networks are used to meet people's basic social needs is given far greater attention. The unified theory of acceptance and use of technology (UTAUT2) is used in this study to examine students' intentions to utilize Facebook for e-learning. In addition to classifying the determinants of intention to utilize e-learning via Facebook into three categories such as hedonic values, utilitarian values and communication values. It integrates playfulness into the UTAUT2 model. 170 undergraduate students completed a two-stage survey to provide the data, and structural equation modelling was used to test the model. We discovered that while habit and facilitating conditions all had a positive impact on students' use of e-learning via Facebook, hedonic motivation, perceived playfulness and performance anticipation were all significant predictors of students' intention to use e-learning. The study's findings provide fresh information that educational institutions can use to design suitable online learning environments for instruction and learning." Numerous managerial and theoretical ramifications for the technology used by universities were also noted.

(Cela et al., 2015) E-learning has grown in importance as a teaching method because it provides students with dynamic online environments for communication, teamwork and information sharing. Despite its potential, social network analysis or SNA is still underrepresented in e-learning research despite being widely used in disciplines like business, economics and medicine. In this systematic review, 37 studies that used SNA to study patterns of interaction in e-learning environments were reviewed. Measures of centrality and density were commonly utilized to analyze learner interactions in one-mode networks which were the subject of the majority of studies. Results suggest that SNA offers useful information about the type and calibre of online interactions, especially when combined with content analysis. It can enhance group composition, optimize course design and assist in identifying students who may be at

danger of disengagement or dropout. The small number of studies, however, points to the necessity of more investigation into two-mode networks and various forms of communication, including blogs, wikis, chat rooms and microblogs.

Research Methodology

The research methodology provides a structured framework that guides the entire research process, ensuring the reliability, validity and precision of the results. This study employs quantitative, qualitative or mixed-methods approach, contingent upon its nature, utilizing both primary and secondary data sources. The methodology explicitly delineates the study design which may be experimental, descriptive and exploratory . It delineates the selection criteria for participants or data samples, encompassing the sampling technique, size and demographic specifics. Data collecting instruments, including questionnaires, interviews, surveys and observational checklists are delineated, along with the justification for their applications. Moreover, the approach delineates the protocols employed in data collection and underscores ethical aspects, including informed consent and confidentiality. Statistical methods, such as SPSS, regression analysis or thematic analysis are utilized for data analysis to derive significant results and evaluate study hypotheses. The research technique provides a coherent and transparent framework for evaluation of the research issues. This augmenting the study's credibility and enable it's future replication.

Research Design

The goal of the present study was to examine the extent of social-media usage in helping to promote academic performance, learning engagement and cognitive outcomes among the high school students in the Cooch Behar district by following a quantitative research design. A descriptive-analytical formulation was used so that the association between social media practices and educational outcomes could be captured in depth and breadth. The choice of this is appropriate since the researcher was able to analyze trends, draw correlations as well as test hypotheses using statistical functions.

Research Approach

The positivist approach was used in the present study because it uses objective analysis and measurable data to come up with conclusions. The main emphasis of the study was to test hypotheses with the help of empirical evidence and therefore highlighted a cause-and-effect relationship between the independent and the dependent variables. With the help of this method, this study sought to provide generalizability to the total population of high school students that were not covered in the sample.

Proposed Method

The research was carried out via a survey method that can be characterised as ideal to collect large and structured data of a specific target population. A structured questionnaire was prepared that comprised questions on demography and questions about the use of social media as well as learning engagement and cognitive outcomes. The survey allowed for reducing variability in answers and gave

measurable data that can be processed with the help of statistical tools.

Sample Size

The sample used in the research was 120 high school students located in the district of Cooch Behar. The respondents were sampled in such a way that they represented various age groups, ages between 14 years and more than 17 years were sampled and both male and female participants were involved. Such a sample size was considered reasonable enough to come up with credible findings and build statistically significant relationships between the variables to be used in this study.

Data Collection

A structured questionnaire was given to selected students of high junior level to gather their primary data. The questionnaire included some demographic questions (age and gender) and research related questions that addressed students as to their use of social media, their participation in e-learning and their perceived academic achievements. The research questionnaire also had statements under Likert scale that could measure the intensity of connectedness and cognitive outcomes namely, critical thinking, problem solving and retention.

Data Analysis

The data that was obtained was measured by both descriptive and inferential statistical methods. A frequency and percentage distribution was used to summarize the demographic profile of the respondents including age and gender. A regression analysis has been used to explore the effects that social media use had on the academic performance and learning engagement process, and the correlation analysis has been utilized to investigate the connection between social media connectivity and cognitive outcomes of students. Such statistical analyses produced significant evidence of how social media practices affected student learning in the form of substantiating or refuting the theory hypotheses

Result

"Table: 1 Age of the respondents.

Age (In years)	Frequency	Percent
14	26	21.7
15	30	25.0
16	34	28.3
Above 17	30	25.0
Total	120	100.0

The above table discusses the frequency and percentage of age of the respondents. In the 14-year age group, frequency is 26 and percentage is 21.7%. In the 15-year age group, frequency is 30 and percentage is 25.0%. In the 16-year age group, frequency is 34 and percentage is 28.3%. In Above 17-Years age group, frequency is 30 and percentage is 25.0%.

Graph: 1 Graphical representation of the age of the respondents.

Table: 2 Gender of the respondents.

Gender	Frequency	Percent
Male	88	73.3
Female	32	26.7
Total	120	100.0

The above table discusses the frequency and percentage of gender of the respondents. In Male group, Frequency is 88 and percentage is 73.3%. In Female group, frequency is 32 and percentage is 26.7%.

Graph: 2 Graphical representation of Gender of the respondents.

Table: 3 Regression analysis for the Impact of Social-Media Usage on Academic Performance and Learning Engagement of High School Students.

Model Summary
Model
R
R Square
Adjusted R Square
Std. Error of the Estimate
1
.704a
.495
.491
3.94370
a. Predictors: (Constant), Social-Media Usage

ANOVAa
Model
Sum of Squares
df
Mean Square
F
Sig.
1
Regression
1798.643
1
1798.643
115.648
.000b
Residual
1835.223
118
15.553
Total
3633.867
119
a. **Dependent Variable:** Academic performance and learning engagement of high school students
b. **Predictors:** (Constant), Social-Media Usage

Coefficientsa
Model
Unstandardized Coefficients
Standardized Coefficients
t
Sig.
B
Std. Error
Beta
1
(Constant)
6.324
1.695
3.732
.000
Social-Media Usage
.723

.067
.704
10.754
.000

a. **Dependent Variable:** Academic performance and learning engagement of high school students

Social media use and high school students' academic achievement and learning engagement are significantly positively correlated," according to the regression study. According to the model summary, social media use has a moderate to strong predictive value, accounting for 49.5% of the variation in students' academic performance and learning engagement (R^2 =.495). The ANOVA table demonstrates that the predictor variable consistently explains changes in the dependent variable, indicating that the regression model as a whole is statistically significant (F = 115.648, p <.001). The coefficients table shows that social media use has a substantial positive impact (β =.704, p <.001), with academic performance and learning engagement increasing by .723 units for every unit increase in social media usage. This implies that higher, meaningful use of social media is positively linked to better student outcomes in terms of learning engagement and performance.

Table: 4 Correlation between Social-Media Connectivity and Students' Cognitive Outcomes.
"Correlations
Social-Media Connectivity
Students' Cognitive Outcomes
Social-Media Connectivity
Pearson Correlation
1
.965**
Sig. (2-tailed)
.000
N
120
120
Students' Cognitive Outcomes
Pearson Correlation
.965**
1
Sig. (2-tailed)
.000
N
120
120
**.

Correlation is significant at the 0.01 level (2-tailed).

According to the correlation analysis, students'" cognitive outcomes and social media connectivity are strongly positively correlated (r =.965, p <.01). This suggests that students' cognitive outcomes, including critical thinking, problem-solving, and recall, likely to improve dramatically as their social media connectivity rises. This correlation's strength (around 1) indicates that the two variables have a very dependable and consistent relationship. The results offer compelling evidence that improved cognitive outcomes among high school students are closely associated with increased social media connectivity, as the relationship is statistically significant at the 0.01 level.

Discussion

The findings of the research indicate that the use of social media affects the achievement and learning participation of high schoolers in Cooch Behar district greatly and in a beneficial way. The regression analysis has also revealed that the percentage of the variance explained in the students' performance and engagement is a near half (49.5%) through social-media usage, implying that this type of technology has become essential in the shadowing of learning behaviour and academic achievements. This is consistent with the findings of previous researchers who claimed that social media creates a collaborative learning environment, improves motivation and increases student-teacher communication. In addition, as the results of the correlation analysis show, the relationships between social media connectivity and problem solving, critical thinking and retention are also very positive (r = .965, p < 0.01). This means that students who are more connected with social media facilitated learning environments will exhibit sharper cognitive skills possibly owing to the interactive, resourceful and peer-supported learning opportunities supported within social media. Nonetheless, whereas the above findings are promising, one has to take into account that the uncontrolled or disorganized use of social media can be viewed as a threat in terms of distraction, loss of concentration and the reliance on a network to an excessive level. Accordingly, the findings necessitate an appropriate and supervised infiltration of social media in e-learning activities where its participatory and social advantages are

optimized to facilitate better learning dynamics and cognitive performance and also reduce the downside.

Conclusion

The research findings indicate that social media can be critical in improving the academic performance and learning engagement, as well as cognitive achievements among high school students in Cooch Behar district. Regression results validate that the social media use is strongly correlated and predicts nearly 50 percent of the variance in the academic performance of students and engagement. These results confirm the possibilities of the social media as an effective educational tool that contributes to collaborative learning, timely communication and access to various learning resources. Simultaneously, the study reminds us of the necessity to use social media in the teaching learning process in a structured and purposeful way so that any distracting elements can be minimized to maximize its advantages. On the whole, the study indicates that when applied purposefully, social media can turn the practices of e-learning into more interactive, engaging and cognitively stimulating activities on the part of students.

Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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