

Social Media Impact on Engineering Students' Academic Performance and Well-being: A Literature Review

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ABSTRACT

The rapid proliferation of social media has significantly transformed the academic and social lives of university students, particularly those pursuing engineering education. While social media platforms offer opportunities for communication, collaboration, and access to educational resources, their excessive and unregulated use has raised concerns regarding academic performance and student well-being. This paper presents a comprehensive literature review examining the impact of social media usage on engineering students' academic achievement, mental well-being, and physical health. Drawing on empirical studies conducted across diverse geographical and educational contexts, the review synthesizes evidence on both the positive and negative effects of social media engagement. Findings indicate that excessive social media use is frequently associated with reduced academic performance, attention deficits, sleep disturbances, social media fatigue, and increased risks of stress, anxiety, and depression. Conversely, purposeful academic use of social media has been shown to enhance self-efficacy, collaborative learning, access to learning resources, and academic motivation. The review further identifies key mediating and moderating factors—including self-efficacy, self-control, self-regulation, sleep quality, and social media fatigue—that shape the complex relationship between social media use, academic outcomes, and well-being. Additionally, bibliographic coupling analysis is discussed as a methodological approach to reveal thematic clusters, research trends, and knowledge gaps within the existing literature. The paper highlights critical limitations in current research, such as the scarcity of longitudinal and intervention-based studies, and underscores the need for evidence-based strategies to promote responsible social media use. Overall, this review provides valuable insights for educators, policymakers, and researchers seeking to balance the educational benefits of social media with its potential risks to engineering students' academic success and holistic well-being.

Keywords: - Social Media, Academic Performance, Engineering Education, Student Well-being, Self-Efficacy, Social Media Fatigue

1. INTRODUCTION

In today's digital age, social media has become an integral part of daily life, profoundly influencing various aspects of society, including education. In the contemporary digital age, social media has become an integral part of daily life, profoundly influencing various aspects of society, including education. This research topic delves into the multifaceted impact of social media on students, encompassing both the positive and negative ramifications [1]. The increasing prevalence of social media usage among university students, particularly engineering students, raises important questions about its effects on academic performance and psychological well-being. With the increased use of social media, it is also said to influence students' psychological health and academic achievement. It is also responsible for raising psychological issues, such as increased possibility of stress, anxiety, and depression. Recent studies have specifically targeted university students to investigate the impact of social media usage and psychological well-being on the academic performance of students [2].

Social media users often feel overwhelmed by the amount of information inundated by followers and friends across various platforms. They devote considerable time to maintaining these online connections, which causes social media fatigue and poses a serious risk to users' wellbeing and productivity. Students, in particular, could become victims of compulsive social media usage, potentially leading to a decline in their academic performance [3]. This literature review synthesizes current research on how social media affects engineering students specifically, examining both the beneficial and detrimental aspects of this relationship.

1.1 Social Media Usage Patterns Among Engineering Students

Understanding the social media usage patterns of engineering students provides essential context for analyzing its impacts. A statistical study on Facebook usage among engineering students at VIT aimed to find the influence that Facebook plays as a social networking medium on undergraduate engineering students. Facebook has been under scrutiny to study its influence on human emotional health, social life, and mental health. The study sought to understand the role Facebook plays in an engineering undergraduate student's life, particularly the extent to which it affects students' academic performance. The survey consisted of 16 questions administered to about 250 respondents from the undergraduate engineering student pool, using simple random sampling with data analysis performed using SPSS [4].

Social Networking Sites (SNS), a popular mode of communication in the present era, offers a varied spectrum of resources and services to the user community like messaging, blogging, sharing pictures, videos, events, and interests with people in their network anywhere in the globe. It has a phenomenal influence in the political, economic, and educational domains of social life and has brought an evident makeover in the attitude, personality, and academic performance of students who are the most ardent users of social media. A study among engineering college students in Kozhikode, Kerala, examined various aspects of SNS usage, including purpose, frequency, impact on academics, and satisfaction levels. Structured questionnaires were used to collect data from a representative sample, and the study revealed that the majority of students use SNS as an interactive platform for friendly communication, with academic usage being comparatively less [5].

Information and communication technologies (ICTs) that facilitate communication with a group of people, helping to share their experiences or discuss with people having similar interests, are popularly known as social media. Social media influences the student community with regard to academic performance. Research has attempted to understand how social media is influencing the academic performance of engineering students while using social networks such as Facebook, Twitter, Orkut, LinkedIn, WhatsApp, and others. One study reported that all respondents (126, 100%) were members of Social Networking Sites, and most strongly agreed that social networking sites provide enough opportunities to promote their academic activities [6].

The time spent on social media is a critical factor in understanding its potential impact. In today's generation, social media has become known worldwide for its ability not just to connect people but to share stories of people. Users can share pictures, videos, sentiments, and happenings in their lives. It is most popular with youth who use different types of social media platforms every day. Students in particular have one or more social media platforms that they use for different reasons, such as Facebook, Instagram, Twitter, Snapchat, YouTube, and the like. It has been part of daily lives and affects the lives of most people today. Research conducted at the University of Santo Tomas aimed to study the relationship between social media and the academic performance of engineering students. The study focused on which social media platforms are most used by students and how these platforms influence their daily activities. It also examined how much time students spend on their social media platforms versus the amount of time they spend completing their academic responsibilities, using students' General Weighted Average (GWA) to determine academic performance [7].

A comprehensive study investigating mobile addiction among engineering students in Coimbatore utilized a structured questionnaire to collect data from 300 engineering students across various colleges. Mobile addiction, characterized by excessive and compulsive use of smartphones, has become a pressing concern in higher education due to its potential adverse effects on academic performance, social relationships, and mental health. The study examined the prevalence of mobile addiction, its impact on academic outcomes, social interactions, and psychological well-being, and identified contributing factors such as academic pressure, social media usage, and availability of entertainment apps. Findings revealed that 65% of respondents exhibited signs of mobile addiction, with a higher incidence among male students and those in their first and second years of study [8].

1.2 Negative Effects on Academic Performance

Several studies have identified negative associations between social media usage and academic performance among engineering students. A significant correlation was found between high mobile usage and lower academic performance, highlighting distractions during lectures and study sessions as major issues [8]. Excessive screen time and engagement with social media have been linked to decreased academic performance, attention deficits, and sleep disturbances [1].

A study investigating the impact of social media use on the academic performance of students at the Federal Polytechnic, Ilaro, employed a survey approach with questionnaires to gather data. Two hypotheses were formulated and data were collected using a questionnaire tagged Social Media Use and Students' Academic Performance Scale (SMUSAPS). The population comprised all students of the Federal Polytechnic, Ilaro, with sampling confined to HND students. Seventy HND students were randomly selected from each of five schools, including Engineering, to make a total of 350 students. Data were analyzed using frequency counts and percentage, and the hypotheses were tested using Chi-square Likelihood Ratio Test at 0.05 level of significance.

The results revealed that participation in social media impairs dedication of students to academic activities and has a negative effect on students' academic performance [9].

The mechanisms through which social media negatively affects academic performance have been explored in various studies. Using a stress-strain-outcome framework, one study attempted to establish the indirect relationship between compulsive use of social media and academic performance decrement via social media fatigue. The study also examined the moderating role of self-control in the relationship between social media fatigue and its negative effect on academic outcomes. The findings suggested the mediating role of social media fatigue between compulsive use of social media and academic performance decrement. Further, the moderating role of self-control was established between social media fatigue and academic performance decline. The originality of the study lies in associating social media fatigue with decrement in academic performance and showing how self-control is helpful in mitigating its effects [3].

Research conducted on the relationship between smartphone addiction, sleep quality, and academic performance found that the greater the smartphone addiction, the lower the academic performance of university students. The findings also demonstrated that students with poor sleep quality might exhibit low academic performance. Smartphone addiction was found to be associated with sleep quality, where overusing smartphones was related to poor sleep quality in university students. Based on these results, the problem of smartphone addiction and sleep quality should be tackled to improve the academic performance of university students and their overall health [10].

1.3 Positive Effects on Academic Performance

Despite the negative associations, several studies have highlighted potential positive impacts of social media on academic performance. Findings from one study revealed that social media usage and social media multitasking are positively and significantly related to students' self-efficacy. Moreover, the results showed that social media usage and multitasking, and students' self-efficacy are significantly associated with their academic performance. The results also exposed the mediational effect of students' self-efficacy on the relationship between social media multitasking and students' academic performance in higher education. The study recommends that initiating self-efficacy programs in promoting social media's academic use and multitasking among higher education students would result in better performance [11].

The results of one study revealed that social media usage for educational purposes positively related to academic performance, while also demonstrating that social media use can negatively affect academic performance. This study highlighted the effect of academic self-efficacy as a mediator in further improving the academic performance of students. Additionally, the empirical results demonstrated that the moderating effect of innovation characteristics between social media usage and academic performance was stronger [12].

Results from research on Chinese university students highlighted that positive and constructive use of social media and healthy psychological well-being are beneficial for enhancing students' academic performance indicators. However, when negative factors like phubbing (skipping surrounding interactions to stay active on social media platforms) prevail, this healthy relationship gets negatively disturbed [2].

The HigherEd 2.0 (HED2.0) program, initiated in 2006, developed and evaluated pedagogical techniques for integrating social media tools into engineering education. Inspired by the rapid adoption of podcasting for entertainment, news, and other non-academic purposes in 2006/2007, the program sought to integrate various social media tools into engineering undergraduate classrooms, evaluate the program using mixed methods targeting specific outcomes, and develop best practices for deployment of social media tools in support of student learning. The program focused on using blogs, video technologies (including podcasts), and student-generated content as powerful and productive pedagogical tools. Throughout the program, a mixed-methods evaluation approach was used, focusing on factual factors (usage data, download statistics), survey response data from students, faculty and student interviews, and student gradebook data. Student response to the program followed a somewhat predictable diffusion of innovations framework, and relationships were examined between student usage and engagement with HED 2.0 technologies and their performance on specific assessments in the course. The study also examined the role of incentives in shaping student use of social media resources, concluding that students generally require an initial motivation to engage with new learning frameworks, but after gaining experience with the HED2.0 techniques, they require fewer incentives to continue their engagement with the social media tools [13].

1.4 Mediating Factors in Academic Performance

Research has identified several mediating factors that influence the relationship between social media use and academic performance. A study investigating the relationship between digital well-being and student performance focused on variables including screen time, social media usage, and sleep quality. The methodology involved a sample of university students from diverse bachelor's and master's degree programs who provided data through self-report surveys. Structural equation modeling (SEM) analysis was conducted to explore the relationships between digital well-being variables and student performance. The findings revealed

significant positive associations between digital well-being and student performance, with sleep quality, screen time, and social media usage predicting better academic achievement. The study concluded that greater social media usage and screen time depicts better student performance, though this was noted as an anomaly that required further discussion [14].

Self-efficacy has emerged as a significant mediating factor in several studies. Research has examined the relationship between social media usage, multitasking of social media, and students' academic self-efficacy on students' academic performance among Malaysian youth. Such work also evaluates the mediating effect of students' academic self-efficacy on social media usage and social media multitasking on their academic performance [11]. Findings revealed that social media usage and social media multitasking are positively and significantly related to students' self-efficacy. Moreover, the results also showed that social media usage and multitasking, and students' self-efficacy are significantly associated with their academic performance. The results also exposed the mediational effect of students' self-efficacy on the relationship between social media multitasking and students' academic performance in higher education [11].

One study aimed to examine the effects of sleep quality on the association between pre-bedtime electronic screen media use for entertainment and academic performance among college students. The researchers hypothesized that sleep quality mediates the association between pre-bedtime electronic screen media entertainment use and academic performance. Results showed that college students with pre-bedtime prolonged electronic screen media use for entertainment (PESM-E) were 1.28-fold more likely to have poor academic performance than those who used electronic screen media less than 60 minutes. Furthermore, pre-bedtime PESM-E was significantly associated with poor sleep quality (adjusted odds ratio=1.87) after controlling for confounders. The mediation model showed that poor sleep quality accounted for 53.08% of the effect of pre-bedtime PESM-E on lower levels of academic performance. The study concluded that pre-bedtime PESM-E is associated with poor academic performance in college students, and this association is mediated by poor sleep quality [15].

2. IMPACT ON WELL-BEING

2.1 Mental Health Implications

Social media use has been linked to various mental health outcomes among students. Concerns have been expressed about the possible adverse impact of increased screen time on the psychological well-being of students during the COVID-19 pandemic. A cross-sectional online survey-based study conducted among Indian college students, including engineering students, collected details regarding sociodemographics, the amount and pattern of screen time usage, and mental well-being (assessed using World Health Organization Well-Being Index). The final study sample comprised 731 medical and engineering undergraduate students with a mean age of 20.7 years. The total screen time across different devices among the study participants for both weekdays and weekends was comparable, with a median value of 540 minutes. Poor mental well-being was significantly associated with higher total screen time. Furthermore, screen time use predominantly to access social media for noncommunication purposes was associated with significantly lower mental well-being scores. The study concluded that higher total screen time use was associated with poor mental well-being, and various types of screen time could have a differential relation with the mental well-being of students [16].

Social media is also responsible for raising psychological issues, such as increased possibility of stress, anxiety, and depression. Research has targeted Chinese university students to investigate the impact of social media usage and psychological well-being on academic performance. It has also incorporated the catalytic role of smartphone addiction and phubbing, which is the skipping of all surrounding interactions to stay active on social media platforms [2].

Socially, over half of engineering students in one study reported feelings of isolation and conflicts in relationships due to excessive mobile use, alongside symptoms of anxiety and depression. The study underscored the urgent need for interventions to address mobile addiction in this demographic. Recommendations included implementing awareness programs, promoting digital well-being, encouraging face-to-face interactions, and providing counseling services to help students manage their mobile phone use effectively [8].

The positive effects of social media on students include enhanced communication and collaboration, access to vast educational resources, and opportunities for self-expression and creativity. Additionally, social media platforms can facilitate peer support networks, fostering a sense of belonging and community among students. Moreover, social media can serve as a platform for academic and career networking, enabling students to connect with mentors, professionals, and potential employers. However, the pervasive use of social media also poses significant challenges and risks for students. Excessive screen time and engagement with social media have been linked to decreased academic performance, attention deficits, and sleep disturbances. Furthermore, social media platforms often expose students to cyberbullying, online harassment, and negative social

comparison, leading to psychological distress and decreased self-esteem. Moreover, the dissemination of misinformation and fake news on social media can hinder students' critical thinking skills and undermine their ability to discern credible sources of information [1].

2.2 Physical Health Considerations

Social media usage has also been linked to physical health issues among students. Smartphone-addicted participants were more likely to have lower academic performance (GPA), be physically inactive, have poor sleep, be overweight/obese, have pain in their shoulder (39.2%), eyes (62.2%) and neck (67.7%), and have a serious mental illness (30.7%) [17].

A cross-sectional study on screen time usage and mental well-being among adolescents collected responses using a self-structured screen time usage scale, the Warwick-Edinburgh Mental well-being scale, and a self-structured screen time effects scale. The findings revealed that 42% and 45% of adolescents were using smartphones for 1-3 hours on weekends and weekdays, respectively. Forty-six percent of adolescents had low mental well-being. The excessive screen time use reported often feeling moods, headache, frustration, poor concentration, and problems with their eyes. The screen time usage was significantly associated with effects of screen usage. The study concluded that adolescents had higher screen time usage on weekends, and increased screen time use was associated with higher negative effects [18].

Previous literature tends to support that social media use is associated with poor sleep and mental health issues in youth, despite some conflicting findings. A scoping review summarized relevant studies published within a three-year period, highlighting the impacts of social media use on sleep and mental health in youth, while also examining possible underlying mechanisms. Both cross-sectional and longitudinal cohort studies demonstrated the negative impacts of social media use on sleep and mental health, with preliminary evidence indicating potential benefits, especially during the COVID period when social restrictions were common [19].

3. MEDIATING AND MODERATING VARIABLES

3.1 Self-efficacy

Self-efficacy has emerged as a crucial mediating variable in the relationship between social media use and academic performance. The findings revealed that social media usage and social media multitasking are positively and significantly related to students' self-efficacy. Moreover, the results also showed that social media usage and multitasking, and students' self-efficacy are significantly associated with their academic performance. The results also exposed the mediational effect of students' self-efficacy on the relationship between social media multitasking and students' academic performance in higher education. The study recommends that by initiating self-efficacy programs in promoting social media's academic use and multitasking among Malaysian higher education students would result in better performance [11].

A study aiming to explore the relationship between information self-efficacy and knowledge sharing behaviors among students in higher education collected data using questionnaires distributed via Google form. The respondents were students from public higher education institutions in Terengganu enrolled in diploma and degree programs whose ages ranged from 18-30 years old. Using SPSS version 27 to analyze 266 returned responses, the study found a positive relationship between Information Self-Efficacy and Knowledge Sharing Behaviour at the 0.01 level (2-tailed) where $r = 0.597$, indicating that as students' information self-efficacy increases, their knowledge sharing behavior tends to increase. The finding supports the hypothesis that information self-efficacy positively influences knowledge sharing behavior among students in higher education institutions [20].

3.2 Self-regulation and Self-control

Self-regulation and self-control have been identified as important moderating variables in several studies. One study examined the moderating role of self-control in the relationship between social media fatigue and its negative effect on academic outcomes. The findings established the moderating role of self-control between social media fatigue and academic performance decline. The analysis can be insightful for students and educators who tend to ignore the negative impact of students' over-reliance on social media on their academic performance. The findings suggest that social media overuse by students requires self-regulation and careful scrutiny by educators in creating appropriate solutions to lessen social media's detrimental influence on higher education [3].

The emergence and wrong use of social media coupled with the lack of initiative for an acceptable learning strategy are factors for poor academic performance. Self-regulated learning improves academic performance, but there is a paucity of research on social media addiction, learning strategies, and self-regulated learning. A study examined the role of social media addiction and learning strategy in undergraduates' self-regulated learning, using responses from 350 participants conveniently sampled across four universities in Nigeria. Using Analysis of Variance and Independent T-test analyses, results showed that learning strategy and social media

addiction have significant influence on self-regulated learning while gender had no significant influence on self-regulated learning. The study concluded that social media addiction and learning strategy are determinants of self-regulated learning and impact the academic performance of undergraduate students [21].

Excessive social media consumption leads to addiction and affects mental health. Previous research on the effects of excessive Internet use shows that people who engage in social media without restraint experience over-involvement, over-disclosure, technostress, and social media fatigue (SMF). SMF, conceptualized as an emotional and cognitive feeling of being overwhelmed, manifests itself in mindless browsing of content, limiting the amount of time spent on social media, or quitting social media altogether. Self-control, although present in the technology addiction literature and psychology research, has been rarely described in relation to both excessive social media use and SMF. One study aimed to verify whether there is a direct relationship between problematic smartphone use and SMF, and whether this association is mediated by self-control. The study included 210 respondents living in different Polish cities who completed measures including the Mobile Phone Problematic Use, the Self-Control Scale, the Social Media Fatigue Scale, and a brief questionnaire with socio-demographic data. The outcomes indicated significant interrelationships between the three studied variables, with the association between problematic smartphone use and SMF being mediated by self-control. The study concluded that a lack of impulse-inhibition skills, such as compulsive checking of notifications, can be a significant factor in social media exhaustion, fatigue, or frustration. SMF can also be understood as a natural defensive response, triggered in situations where individuals are overwhelmed, when self-control is insufficient to stop the compulsion to use social media, and the use of a smartphone for this purpose is excessively engaging [22].

3.3 Social Media Fatigue

Social media fatigue has emerged as a significant concept in the relationship between social media use and both academic performance and well-being. Social media fatigue (SMF), which refers to social media users' tendency to withdraw from social media because of feeling overwhelmed, is closely related to individuals' social life and well-being. Many studies have focused on understanding SMF and exploring its enablers and influences. However, few pieces of research administered a standard measurement of SMF. One study aimed to develop and validate a measure of SMF, conducting a cross-sectional survey among 1599 participants. Semi-structured interviews of 30 participants were firstly conducted as a pilot study, and an initial version of the social media fatigue scale (SMFS) with 24 items was generated. Then, both exploratory factor analysis and confirmatory factor analysis, as well as reliability and validity analysis, were conducted, and a 15-item SMFS was finally developed. The results demonstrated that: 1) SMF was a multi-dimension concept including a cognitive aspect, an emotional aspect, and a behavioral aspect; 2) the three-dimensional structure of the SMFS (cognitive-behavioral-emotional structure) fitted the data well; 3) the McDonald's Omega coefficients for the SMFS was 0.83, suggesting that the SMFS was reliable; 4) criterion validity was satisfactory as indicated by both the significant correlations between self-rated scores of fatigue and total SMFS scores and the significant regression model of SMF on social media privacy, social media confidence, and negative feeling after comparison [23].

In the digital era, social media is increasingly permeating the fragmented lives of people. While enjoying the convenience and speed of online socializing, people are gradually surrounded by a variety of information. Research found that young people are plagued by negative comparisons, interaction dysfunction, information overload, social overload, and intergenerational communication in the process of participating in social media. Increasing numbers of young people feel overwhelmed in the process of online socialization, and the phenomenon of social media fatigue (SMF) gradually spreads. One study combined existing relevant theoretical models of the influencing factors of SMF and real-life empirical materials of youth groups, enriching the research with new variables and validating the data through a questionnaire survey (n = 663) to explore the influencing factors of SMF of youth groups. It was found that negative comparison, interaction dysregulation, information overload, social overload, self-efficacy, and impression management all had significant positive effects on SMF behaviors, while privacy anxiety and intergenerational communication had no significant positive effects on SMF behaviors [24].

4. METHODOLOGICAL APPROACHES IN CURRENT RESEARCH

4.1 Research Designs

The reviewed literature employed various research designs to investigate the impact of social media on engineering students. In one study, 195 samples were collected from full-time undergraduate students studying in the University from different faculties including business, engineering, law, English Studies, and Language Studies. Descriptive statistics analysis was used to analyze the demographic data while inferential statistics was used in testing the research hypotheses. The results obtained from the analyses were used to interpret the outcomes [25].

A cross-sectional research design and quantitative data collection approach was used in one study, gathering data from 644 Malaysian students of higher education institutions. The collected data were analyzed using SPSS v23 and PLS-SEM-based SmartPLS 3.1 [11].

In another study, 64 samples were collected from full-time undergraduate students studying in Prince Sattam bin Abdulaziz University from different colleges including Community college, College of Business Administration, College of Education, College of Engineering, and College of Pharmacy. The descriptive statistics analysis was used to analyze the demographic data while inferential statistics were used in testing the research hypotheses. The results obtained from the analyses were used to interpret the outcomes [26].

4.2 Measurement Tools

Various scales and measurement tools have been employed to assess social media usage, addiction, and related variables. A quantitative research design was employed in one study, utilizing a survey method with a questionnaire distributed via Google Forms to students. The Bergen Social Media Addiction Scale (BSMAS), which consists of six items, was used to measure social media usage among students. Additionally, the Academic Success Inventory for College Students (ACICS) was used to assess Skills, Confidence in Abilities, and Personal Adjustment [27].

In another study, 938 undergraduate students participated in a cross-sectional study to determine whether demographic variables, personality traits, and degrees of social media addiction and fear of missing out could explain phubbing behavior. Participants responded to a survey that included the Bergen Social Media Addiction Scale (BSMAS), Fear of Missing Out Scale (FoMO), Ten-Item Personality Inventory (TIPI), and Phubbing Scale (Phubbing). Bivariate correlations identified that BSMAS and FoMO were significantly positively correlated with phubbing while TIPI displayed a significantly negative correlation with phubbing. Further, hierarchical multiple regression analyses established that BSMAS holds the most predictive power for phubbing while FoMO displayed a significantly less robust predictive power. TIPI was shown to be significant but served less to explain the variance in phubbing behaviors [28].

A simple random sampling was used in one study. The Smartphone Addiction Scale Short Version (SAS-SV) and the Pittsburgh Sleep Quality Index (PSQI) were used. SPSS was used as a tool of analysis for descriptive and inferential analysis. Pearson correlation was involved to test the hypothesis of the study [10].

4.3 Analytical Approaches

Various analytical approaches have been employed to understand the complex relationships between social media use, academic performance, and well-being. One study investigated the effects of social media usage on students' learning outcomes, using data from the Programme for International Student Assessment (PISA) 2018 database. In order to eliminate selection bias and assess the causal effect of using social media on learning, this research used propensity score matching (PSM) as an approach. By conducting analyses in each participating country, researchers were able to observe how the effects of social media use for school learning vary in different social, cultural, and political contexts. After obtaining the average treatment effects of each country, they found that the effects of social media use on learning varied significantly by country. In countries such as Mexico and Turkey, a positive relationship was observed between social media usage for academic purposes and student performance. Conversely, in countries such as the US and UK, a negative relationship was evident [29].

Throughout one program, a mixed-methods evaluation approach was used, focusing on factual factors (usage data, download statistics), survey response data from students, faculty and student interviews, and student gradebook data. The researchers found that student response to the program follows a somewhat predictable diffusion of innovations framework, and presented data from student surveys, factual usage data, and interviews with students. They also examined the relationships between student usage and engagement with HED 2.0 technologies and their performance on specific assessments in the course, including homeworks, quizzes, and exams, characterizing several model student profiles based upon the apparent impact of technology usage on their academic performance [13].

Based on data from the 2022 Chinese Minors' Digital Life and Online Protection Survey, one study investigated the status quo of social media use and its influencing mechanism on academic performance among Chinese children and adolescents. The statistical results indicated that the average level of Chinese students' social media use was generally low, with their academic performance varying across socio-demographic and schooling characteristics. After controlling for other variables, it was found that the frequency of social media use could exert a significant positive impact on students' academic performance. Moreover, the mechanism analysis revealed that online learning behavior and prosocial behavior served as chain mediators linking social media use to academic performance. Specifically, students could transfer their social media behavioral patterns to the internet-based learning context, and then effectively utilize remote learning resources. Meanwhile, engagement with social media would cultivate individuals' prosocial personality, thereby stimulating intrinsic motivation for learning and ultimately enhancing academic performance. The heterogeneity analysis further confirmed that the

impact of social media use on students' academic performance was stronger in lower-class families, underscoring the moderating role of family socioeconomic status in the relationship between social media use and academic performance [30].

5.GAPS IN RESEARCH AND FUTURE DIRECTIONS

Despite the growing body of research on social media's impact on engineering students, several gaps and limitations exist in the current literature. Although mental health and well-being (MHW) in engineering is a growing area of research internationally, current MHW research in engineering is nascent and focused on the characterization of student mental health issues. Researchers underutilize qualitative and mixed-methods approaches, longitudinal and experimental designs, guiding frameworks, and robust sampling techniques. Academic and mindfulness interventions, as well as the use of mental wellness constructs from positive psychology, show promise for supporting MHW in engineering [31].

Although adolescents are more vulnerable to negative effects of digital technology use, effects are comparable for both adolescents and adults. It appears that both low and excessive use are related to decreased well-being, whereas moderate use is related to increased well-being. Current research still has many limitations: High-quality studies with large-scale samples, objective measures of digital technology use, and experience sampling of well-being are missing [32].

The limited longitudinal research has hindered the establishment of directionality and causality in the association among social media use, sleep, and mental health [19]. Future research should include the implementation of cohort studies with representative samples to investigate the directionality and causality of the complex relationships among social media use, sleep, and mental health; the use of validated questionnaires and objective measurements; and the design of randomized controlled interventional trials to reduce overall and problematic social media use that will ultimately enhance sleep and mental health outcomes in youth [19].

Research has unveiled that the majority of students use social networking sites (SNS) as an interactive platform for friendly communication and academic usage is comparatively less. Awareness needs to be raised for the intelligent usage of social media by educating students about the applications, benefits, and risks related to social networking sites [5].

Research synthesizes existing literature to provide a comprehensive understanding of the impact of social media on students, highlighting the complexities and nuances of this phenomenon. By elucidating the various dimensions of social media's influence on students, this research aims to inform educators, parents, policymakers, and students themselves about the opportunities and challenges inherent in navigating the digital landscape. Additionally, there is a need for recommendations for promoting responsible social media usage and mitigating its adverse effects on students' well-being and academic success [1].

5.1 Discussion on Bibliographic Coupling in the Context of Social Media's Impact on Engineering Students

Bibliographic coupling serves as a powerful tool for scientific research to identify relationships between academic publications based on general references. In relation to analyzing the effects of social media on academic achievement and engineering student wells, bibliographic coupling allows researchers to uncover similarities in the themes between existing studies by examining commonly cited references. This combination indicates the possible similarity of research focus, methodology, or rationale. For example, a group of research focused on social media as a distraction in an academic setting can cite basic psychological theories, such as attentional theory and time interpretation theory. Another group can focus on the positive effects of social media and focus on research related to collaborative learning, peer engagement, or virtual community of practice. The research is based on general references that reveal subtopics such as mental health, academic postponement, and social media impact as learning tools. This increases the reliability and depth of the review by agreement with established levels of knowledge.

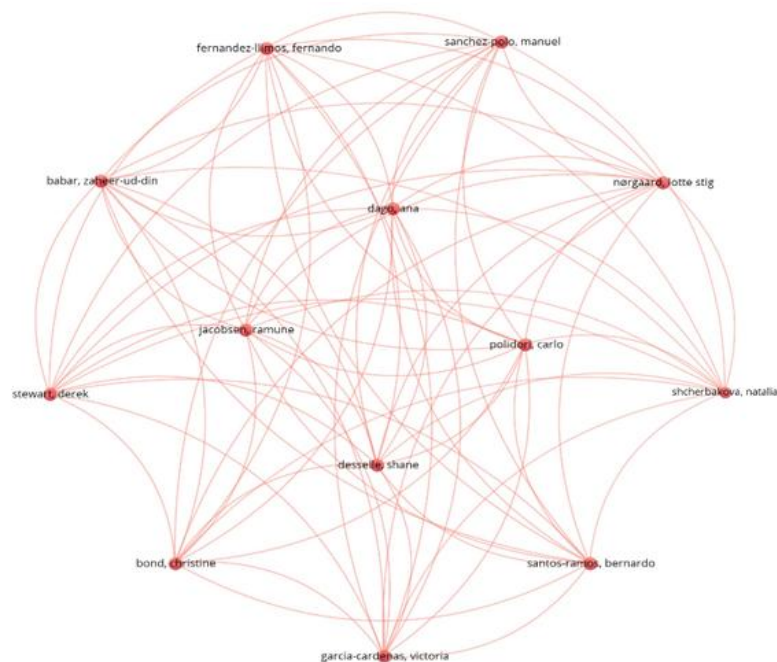


Fig.1. Network Visualization of Co authorship and Author

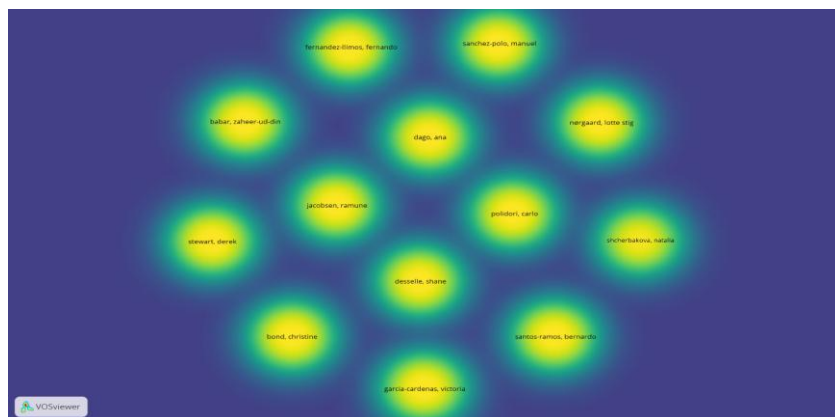


Fig. 2. Density Visualization of Co authorship and Author

6. CONCLUSIONS

This literature review has explored the complex relationship between social media usage and engineering students' academic performance and well-being. The impact of social media encompasses both positive and negative ramifications. The positive effects include enhanced communication and collaboration, access to vast educational resources, and opportunities for self-expression and creativity. Additionally, social media platforms can facilitate peer support networks, fostering a sense of belonging and community among students. Moreover, social media can serve as a platform for academic and career networking, enabling students to connect with mentors, professionals, and potential employers [1].

However, the pervasive use of social media also poses significant challenges and risks for students. Excessive screen time and engagement with social media have been linked to decreased academic performance, attention deficits, and sleep disturbances. Furthermore, social media platforms often expose students to cyberbullying, online harassment, and negative social comparison, leading to psychological distress and decreased self-esteem. Moreover, the dissemination of misinformation and fake news on social media can hinder students' critical thinking skills and undermine their ability to discern credible sources of information [1].

The literature reveals that the relationship between social media use and academic performance is not straightforward but is mediated by various factors such as self-efficacy, self-control, and social media fatigue. The findings suggest the mediating role of social media fatigue between compulsive use of social media and academic performance decrement. Further, the moderating role of self-control was established between social

media fatigue and academic performance decline. The originality of the study lies in associating social media fatigue with decrement in academic performance and showing how self-control is helpful in mitigating its effects. This analysis can be insightful for students and educators who tend to ignore the negative impact of students' over-reliance on social media on their academic performance. The findings suggest that social media overuse by students requires self-regulation and requires careful scrutiny by educators in creating appropriate solutions to lessen social media's detrimental influence on higher education [3].

The results from various studies revealed that participation in social media impairs dedication of students to academic activities and that it has a negative effect on students' academic performance. Based on these findings, it is recommended that since there are perceived opportunities and advantages in the use of social media networks, lecturers, parents, guardians, and sponsors should always make efforts to educate students on the adverse consequences of excessive use of social media to ensure that students' addiction to social media, especially for social activities alone, is reduced and to facilitate learning outcomes among the students [9].

Future research should focus on addressing the identified gaps, particularly the need for longitudinal studies to establish causality, intervention studies to promote healthy social media use, and mixed-method approaches to gain a deeper understanding of the mechanisms through which social media affects engineering students' academic performance and well-being. By building on the current knowledge base, researchers, educators, and policymakers can develop evidence-based strategies to maximize the benefits of social media while minimizing its potential negative impacts on engineering students.

In summary, bibliographic coupling is an important methodological tool for organizing and analyzing the scientific literature in relation to the impact of social media on academic achievement and the wells of engineering students. Identification of general references between studies revealed basic work at research patterns, theme clusters, and sites. This approach not only improves the quality and consistency of the literature overview, but also helps researchers to recognize emerging trends and research gaps. Due to the growing influence of social media, bibliographical combinations in the mapping of academic performance, digital behavior, and interdisciplinary landscapes of student wells remain critical.

7. REFERENCES

- [1] Jha, Raj Ranjan. 2024. "IMPACT OF SOCIAL MEDIA ON STUDENTS". *INTERANTIONAL JOURNAL OF SCIENTIFIC RESEARCH IN ENGINEERING AND MANAGEMENT*. <https://doi.org/10.55041/ijrsrem32045>
- [2] Ma, Haoran. 2024. "Disentangling the Relationship Between Social Media Use, Psychological Well-Being, and Academic Performance Among Chinese University Students". *American Journal of Health Behavior*. <https://doi.org/10.5993/ajhb.48.3.5>
- [3] Singh, Sonali, Gupta, Pragya, Jasial, Sumeet Singh, and Mahajan, Aarushi. 2023. "Correlates of compulsive use of social media and academic performance decrement: A stress-strain-outcome approach". *Journal of Content Community and Communication*. <https://doi.org/10.31620/jccc.06.23/10>
- [4] C, Keerthika, Raghavan, M., and V.M, Chandrasekaran. 2018. "A Statistical Study on Impact of Facebook Usage of Engineering Students at VIT". *International journal of engineering and technology*. <https://doi.org/10.14419/ijet.v7i4.10.21215>
- [5] Shilpa, V. and Sreekala, P.. 2019. "The Usage and Upshots of Social Networking Sites: A Study among Students of Engineering Colleges in Kozhikode City, Kerala". *Asian Journal of Information Science and Technology*. <https://doi.org/10.51983/ajist-2019.9.s1.219>
- [6] Naveen, C. and Nagesh, R.. n.d.. "Use of social media & Its impact on academic performance of engineering students: A study". . <https://doi.org/10.5958/2320-317X.2017.00016.2>
- [7] Ngo, J., ROSARIO, H. DEL, Pangan, Dania Marie B, and Villadelrey, Mikaela Mae A. 2020. "An Analysis On The Effects Of Social Media On Students' Academic Performance: The Case Of Selected Students Of The Faculty Of Engineering Of The University Of Santo Tomas". *Journal of Physics: Conference Series*. <https://doi.org/10.1088/1742-6596/1529/3/032051>
- [8] kumar, A. S.. 2024. "EXAMINING MOBILE ADDICTION AND ITS IMPACT ON ENGINEERING STUDENTS IN COIMBATORE: A COMPREHENSIVE STUDY". *International Journal of Engineering Applied Sciences and Technology*. <https://doi.org/10.33564/ijeast.2024.v09i04.013>
- [9] Idoro, Iro, Bose, C., Jimoh, J., and Adisa, Tajudeen. 2017. "Social Media Use among Students of Federal Polytechnic Ilaro, Ogun State, Nigeria: Implication on Academic Performance". *IOSR Journal of Humanities and Social Science*. <https://doi.org/10.9790/0837-2204085966>
- [10] Rathakrishnan, B., Singh, Soon Singh Bikar, Kamaluddin, M., Yahaya, A., Nasir, Mohd Azrin Mohd, Ibrahim, F., and RAHMAN, Z. AB. 2021. "Smartphone Addiction and Sleep Quality on Academic Performance of University Students: An Exploratory Research". *International Journal of Environmental Research and Public Health*. <https://doi.org/10.3390/ijerph18168291>

- [11] Mohammed, Mahir Tahrir Salih, Ibrahim, F., and Yunus, N.. 2021. "Exploring The Relationship of Social Media Usage and Multitasking of Social Media on Self-Efficacy and Academic Performance". Jurnal Komunikasi: Malaysian Journal of Communication. <https://doi.org/10.17576/jkmjc-2021-3701-13>
- [12] Boahene, Kingsley O., Fang, Jiaming, and Sampong, Frank. 2019. "Social Media Usage and Tertiary Students' Academic Performance: Examining the Influences of Academic Self-Efficacy and Innovation Characteristics". Sustainability. <https://doi.org/10.3390/su11082431>
- [13] Berger, E., Pan, Edward A., Orange, A., Heinecke, Walter F., and Heinecke, Walter F.. 2014. "A Preliminary Summative Assessment of the HigherEd 2.0 Program - Using Social Media in Engineering Education". 2014 ASEE Annual Conference & Exposition Proceedings. <https://doi.org/10.18260/1-2--19984>
- [14] Qureshi, Ahmed Ali. 2024. "Digital Well-being and Student Performance: The Effect of Screen Time, Social Media Usage on Students Performance mediated by Sleep Quality". Human Nature Journal of Social Sciences. <https://doi.org/10.71016/hnjss/hdp1jd98>
- [15] Mao, Yajun, Xie, Biyao, Chen, Baixin, Cai, Y., Wu, Jiahao, Zhang, Jiansheng, Shao, R., and Li, Yun. 2022. "Mediating Effect of Sleep Quality on the Relationship Between Electronic Screen Media Use and Academic Performance Among College Students". Nature and Science of Sleep. <https://doi.org/10.2147/NSS.S346851>
- [16] Ganesh, Ragul, Singh, Swarndeep, Bhargava, Rachna, and Balhara, Y.. 2022. "Screen time and mental well-being of students during the COVID-19 pandemic: Findings from a survey among medical and engineering students". Indian Journal of Social Psychiatry. https://doi.org/10.4103/ijsp.ijsp_365_21
- [17] Alotaibi, M. S., Fox, Mim, Coman, Robyn, Ratan, Z. A., and Hosseinzadeh, H.. 2022. "Smartphone Addiction Prevalence and Its Association on Academic Performance, Physical Health, and Mental Well-Being among University Students in Umm Al-Qura University (UQU), Saudi Arabia". International Journal of Environmental Research and Public Health. <https://doi.org/10.3390/ijerph19063710>
- [18] Kaur, Harpreet and Rana, Hemant Singh. 2024. "Screen Time Usage and Mental well-being among adolescents: A Cross-Sectional Study". International Journal For Multidisciplinary Research. <https://doi.org/10.36948/ijfmr.2024.v06i04.25671>
- [19] Yu, Danny J, Wing, Y., Li, Tim M H, and Chan, N.. 2024. "The Impact of Social Media Use on Sleep and Mental Health in Youth: a Scoping Review". Current Psychiatry Reports. <https://doi.org/10.1007/s11920-024-01481-9>
- [20] Hamzah, Siti Fatimah Mardiah, Rashid, Ruzaidah Sulong@A., Salleh, Suzila Mat, Ali, Noor Malinjasari, Nor, Raslina Mohamed, Noor, Hasmida Mohd, and Mohammed, N.. 2024. "Exploring the Relationship between Information Self-Efficacy and Knowledge Sharing Behaviour on Social Media among Higher Education Students". International Journal of Academic Research in Business and Social Sciences. <https://doi.org/10.6007/ijarbs/v14-i10/22883>
- [21] Iyiola, Ebunoluwa T., Azikiwe, J., and Omolayo, Benjamin O.. 2021. "Undergraduates Self-Regulated Learning: the Place of Social Media Addiction and Learning Strategies". Indonesian Journal of Curriculum and Educational Technology Studies. <https://doi.org/10.15294/ijcets.v9i1.43726>
- [22] Świątek, A., Szcześniak, Małgorzata, Aleksandrowicz, Blanka, Zaczekowska, Daria, Wawer, W., and Ścisłowska, Małgorzata. 2023. "Problematic Smartphone Use and Social Media Fatigue: The Mediating Role of Self-Control". Psychology Research and Behavior Management. <https://doi.org/10.2147/PRBM.S389806>
- [23] Zhang, Shiyi, Shen, Yanni, Xin, Tao, Sun, Haoqi, Wang, Yilu, Zhang, Xiaotong, and Ren, Siheng. 2021. "The development and validation of a social media fatigue scale: From a cognitive-behavioral-emotional perspective". PLoS ONE. <https://doi.org/10.1371/journal.pone.0245464>
- [24] Liu, Yixuan and He, Jianping. 2021. "“Why Are You Running Away From Social Media?” Analysis of the Factors Influencing Social Media Fatigue: An Empirical Data Study Based on Chinese Youth". Frontiers in Psychology. <https://doi.org/10.3389/fpsyg.2021.674641>
- [25] Khatib, Dr. Mohamad El and Khan, D. M.. 2017. "IMPLICATIONS OF SOCIAL MEDIA NETWORKS TECHNOLOGY IN INTERPERSONAL SKILLS AND ACADEMIC PERFORMANCES". International Journal of Management, Innovation & Entrepreneurial Research. <https://doi.org/10.18510/ijmier.2017.326>
- [26] Nasrullah, Syed and Khan, Firdouse R. 2019. "Examining the Impact of Social Media on the Academic Performances of Saudi Students - Case Study: Prince Sattam Bin Abdul Aziz University". Humanities & Social Sciences Reviews. <https://doi.org/10.18510/hssr.2019.75111>
- [27] Rasid, Aida Roha Abdul, Azhari, Muhammad Ameer Farhan Mohd, Radzuwan, Radzliyana, Shafie, Mohd Shariman, Zulzali, Muhammad Asraf, and Akin, Yogi. 2024. "Association of Social Media Usage on Academic Performance among Students at Faculty of Sport Science and Recreation (FSR), Uitm Malaysia". International Journal of Academic Research in Business and Social Sciences. <https://doi.org/10.6007/ijarbs/v14-i11/23333>
- [28] Chi, Li-Chiu, Tang, Tseng-Chung, and Tang, Eugene. 2022. "The phubbing phenomenon: a cross-sectional study on the relationships among social media addiction, fear of missing out, personality traits, and phubbing behavior". Current Psychology. <https://doi.org/10.1007/s12144-021-02468-y>

- [29] Ji, Zhiqiang and Pang, Jia. 2023. "Social media and student academic performance: A cross-country analysis using PISA 2018". International Journal of Educational Technology and Learning. <https://doi.org/10.55217/101.v15i1.687>
- [30] Hou, Yu, Qin, Chuting, and Xu, Peng. 2024. "Social Media Use and Academic Performance in Chinese Children and Adolescents: A Moderated Chain Mediation Model". Behavioral Science. <https://doi.org/10.3390/bs14100867>
- [31] Asghar, M., Minichiello, A., and Ahmed, Shaf. 2023. "Mental health and wellbeing of undergraduate students in engineering: A systematic literature review". Journal of Engineering Education. <https://doi.org/10.1002/jee.20574>
- [32] Dienlin, T. and Johannes, Niklas. 2020. "The impact of digital technology use on adolescent well-being". Dialogues in Clinical Neuroscience. <https://doi.org/10.31887/DCNS.2020.22.2/dienlin>