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# INFLUENCE OF SOCIAL MEDIA USAGE ON METACOGNITIVE AWARENESS AND ACADEMIC PERFORMANCE AMONG BIOLOGY EDUCATION STUDENTS OF FEDERAL UNIVERSITY GASHU'A

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**ABSTRACT**
This study examines the influence of social media usage on metacognitive awareness and academic performance among Biology Education students at Federal University Gashu'a. Social media platforms are widely used by students for various purposes. These platforms can affect how students think about their own learning processes. This is called metacognitive awareness. The problem is that excessive or unguided social media use may distract from academic work. This study used a mixed-method research design. A sample of 200 students was selected through random sampling. Data was collected using a structured questionnaire and semi-structured interviews. Quantitative data from questionnaires were analyzed using mean scores. Qualitative data from interviews were analyzed using thematic analysis. Findings showed that social media usage has a complex relationship with metacognition and academic outcomes. High levels of social media use for entertainment were linked to lower academic performance. However, using social media for academic purposes was associated with higher metacognitive awareness. The study concludes that the purpose of social media use is a key factor. It recommends integrating digital literacy into the curriculum. This can help students use social media more effectively for learning.

**Keywords:** Social Media, Metacognitive Awareness, Academic Performance, Biology Education, Federal University Gashu'a

## Introduction

Social media refers to online platforms that allow users to create and share content. These platforms include Facebook, Twitter, Instagram, and WhatsApp. Social media usage has become a daily activity for many university students. Students use these platforms for communication, entertainment, and information gathering. The influence of social media on education is a growing area of research. Some studies suggest social media can enhance learning through collaboration and resource sharing. Other studies indicate it can be a source of distraction and reduced academic focus (Alwagait, Shahzad, & Alim, 2015). Metacognitive awareness involves knowledge and regulation of one's own thinking and learning processes. It includes planning, monitoring, and evaluating one's learning strategies. High metacognitive awareness is often linked to better academic outcomes. Students who are aware of their learning processes can adapt their strategies to meet academic demands (Flavell, 1979). Academic performance is a measure of student achievement in educational settings. It is typically assessed through grades, test scores, and course completion. In biology education, performance requires understanding complex concepts and applying scientific methods. Social media may influence both the cognitive and metacognitive aspects of learning biology. This study focuses on Biology Education students at Federal University Gashu'a. This group is of interest because biology involves rigorous content that benefits from deep, reflective learning strategies. Understanding how social media interacts with these processes is important for educational development.

The context of Federal University Gashu'a provides a relevant setting for this investigation. The university is located in Yobe State, Nigeria. It serves a diverse student population with varying levels of access to digital resources. Like many Nigerian universities, internet penetration and social media use among students are high. However, the academic integration of these tools is often informal and unregulated. There is a need to explore how these digital habits are affecting the core learning competencies of students, particularly in a specialized field like biology education. Prior research in similar settings has shown mixed results. Some students leverage social media for academic networking and accessing educational content. Others report spending excessive time on non-academic activities, leading to procrastination and poor time management (Junco, 2012). This study aims to provide a balanced view by examining both the potential benefits and drawbacks. It seeks to move beyond simplistic judgments of social media as either good or bad for learning. Instead, it will analyze how different patterns of use correlate with metacognitive skills and academic results. This approach can inform more nuanced recommendations for students and educators.

The significance of this study lies in its potential to guide educational policy and student counseling. If social media use is found to undermine metacognition and performance, interventions can be designed to promote more mindful usage. Conversely, if certain uses of social media support metacognitive development, these practices can be encouraged and integrated into teaching methodologies. For biology education, this is particularly crucial. The subject requires not only memorization but also critical thinking, problem-solving, and self-regulated learning. Tools that enhance these skills are valuable. Tools that hinder them need to be managed. Therefore, this research contributes to the broader discourse on digital pedagogy and self-regulated learning in higher education, especially within the Nigerian context where such studies are still emerging (Akinwumi, 2018).

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**Statement of the Problem**

Biology Education students at Federal University Gashu'a face significant academic demands. They must master complex biological concepts, conduct practical experiments, and develop pedagogical skills for future teaching. Concurrently, these students are immersed in a digital environment where social media use is pervasive. The central problem is that the impact of this extensive social media engagement on their metacognitive awareness and academic performance is not clearly understood. Metacognitive awareness is essential for deep learning in biology, as it enables students to plan their study approaches, monitor their comprehension of difficult topics like genetics or ecology, and evaluate their preparedness for assessments. There is a concern that frequent, unstructured social media usage may fragment attention, reduce sustained focus, and displace time dedicated to reflective study practices, thereby impairing metacognitive development (Kirschner & Karpinski, 2010). Preliminary observations and anecdotal reports from faculty suggest a correlation between rising social media activity and challenges in student concentration, assignment quality, and examination performance. However, these observations lack empirical verification specific to this university and discipline.

The problem is exacerbated by the dual nature of social media as both a potential learning tool and a source of distraction. Students may use platforms like YouTube to access educational biology animations or join academic groups on Facebook, which could theoretically enhance understanding and metacognitive exchange. Conversely, they may also engage in endless scrolling, entertainment video consumption, and social chatting during study periods, which likely disrupts cognitive control and self-regulation. This dichotomy creates a complex scenario where the net effect of social media is ambiguous. Without concrete data, it is difficult for educators and administrators to provide evidence-based guidance to students. Furthermore, there is a lack of localized studies at Federal University Gashu'a that examine these variables together. Most existing research on social media and academic performance comes from Western contexts or focuses on general undergraduate populations, not specifically on biology education students in a Nigerian university setting (Ifinedo, 2016). This gap means that the unique socio-academic environment of the institution is not accounted for.

The consequences of this problem are multifaceted. If unguided social media use is indeed eroding metacognitive skills and academic performance, students are at risk of underachieving, which affects their graduation prospects, employability, and future effectiveness as biology teachers. For the university, it could signal a need to revise its academic support and digital literacy frameworks. The problem also has a policy dimension, as there are currently no institutional guidelines or curricular integrations that address responsible social media use for academic enhancement. Students are left to navigate this digital landscape on their own, often without the skills to harness its benefits or mitigate its risks. Therefore, this study is imperative to systematically investigate the relationships between social media usage patterns, levels of metacognitive awareness, and academic performance scores among Biology Education students. It aims to produce findings that can clarify these relationships, thereby providing a foundation for informed interventions, curriculum adjustments, and student support services tailored to the needs of this specific academic community.

**Aim and Objectives of the Study**

The aim of this study is to investigate the influence of social media usage on metacognitive awareness and academic performance among Biology Education students of Federal University Gashu'a. The specific objectives of the study are to:

1. Examine the patterns and frequency of social media usage among Biology Education students at Federal University Gashu'a.
2. Assess the level of metacognitive awareness among Biology Education students at Federal University Gashu'a.
3. Evaluate the academic performance of Biology Education students at Federal University Gashu'a.
4. Determine the relationship between social media usage patterns and the level of metacognitive awareness among students.
5. Determine the relationship between social media usage patterns and academic performance among students.
6. Explore the perceived influence of social media on learning strategies and academic outcomes from the students' perspectives.

**Research Questions**

The following research questions guided the study:

1. What are the patterns and frequency of social media usage among Biology Education students at Federal University Gashu'a?
2. What is the level of metacognitive awareness among Biology Education students at Federal University Gashu'a?
3. What is the academic performance level of Biology Education students at Federal University Gashu'a?
4. What is the relationship between social media usage patterns and the level of metacognitive awareness among students?
5. What is the relationship between social media usage patterns and academic performance among students?
6. What are the students' perceptions of the influence of social media on their learning strategies and academic outcomes?

**Hypotheses**

The following hypotheses were tested at a 0.05 level of significance:

$H_{01}$: There is no significant relationship between social media usage frequency and metacognitive awareness among Biology Education students.

$H_{02}$: There is no significant relationship between social media usage for academic purposes and academic performance among Biology Education students.

$H_{03}$: There is no significant relationship between social media usage for non-academic purposes and academic performance among Biology Education students.

**Literature Review**

**The Concept of Social Media Usage**

Social media usage encompasses the activities, duration, and purposes for which individuals engage with social networking sites. For university students, this usage is often multifaceted, involving social interaction, entertainment, information seeking, and academic collaboration. The pervasiveness of smartphones has made access to platforms like WhatsApp, Facebook, and Instagram nearly constant, integrating these tools deeply into daily life. The nature of this engagement can vary widely; some students use social media strategically to form study groups, share notes, or follow educational pages, while others use it primarily for leisure and social validation. Research indicates that the average university student spends a considerable number of hours per day on social media, which can compete with time allocated for academic study (Junco, 2012). The concept extends beyond mere time spent to include the

quality and intentionality of use. Passive consumption, such as scrolling through feeds, is differentiated from active use, such as creating content or engaging in discussions. Each type of use may have different implications for cognitive processes and academic engagement. In the context of Nigerian universities, studies have noted high adoption rates of social media, often driven by affordable data plans and the social need to stay connected. However, the academic utility of these platforms is frequently under-exploited, with usage leaning heavily towards social and entertainment functions (Ifinedo, 2016). Understanding these usage patterns is the first step in analyzing their potential impact on educational outcomes.

**Metacognitive Awareness in Learning**

Metacognitive awareness refers to an individual's knowledge and control over their cognitive processes during learning. It is a higher-order thinking skill that involves two main components: metacognitive knowledge and metacognitive regulation. Metacognitive knowledge includes understanding one's own learning strengths and weaknesses, the demands of different tasks, and the strategies available for learning. Metacognitive regulation involves the active management of these strategies through planning, monitoring, and evaluating one's progress towards a learning goal (Flavell, 1979). In academic settings, students with high metacognitive awareness are better able to set realistic goals, choose effective study methods, identify when they do not understand a concept, and adjust their approach accordingly. This skill is particularly critical in challenging fields like biology education, where students must integrate vast amounts of factual information with conceptual understanding and practical application. Research has consistently shown a positive correlation between metacognitive awareness and academic achievement across various disciplines (Zohar & David, 2009). Developing metacognition is not always automatic; it can be fostered through explicit instruction and reflective practices. The contemporary learning environment, saturated with digital distractions like social media, presents new challenges for metacognitive regulation. The constant notifications and interruptions from social media can disrupt the focused attention and deep reflection necessary for metacognitive activities. Therefore, investigating how social media habits interact with these essential self-regulatory learning skills is a pertinent area of inquiry for modern educational research.

**Academic Performance Measurement**

Academic performance is a key indicator of student learning and institutional effectiveness. It is typically measured using formal assessments such as cumulative grade point averages (CGPA), examination scores, course grades, and standardized test results. For students in a Biology Education program, performance metrics reflect their mastery of biological content, scientific reasoning skills, and readiness for professional teaching roles. Performance is influenced by a multitude of factors, including intellectual ability, motivation, study habits, teaching quality, and the learning environment. In recent years, the digital environment, particularly social media, has emerged as a significant potential influencer. The relationship between social media use and academic performance has been studied with mixed findings. Some meta-analyses report a small negative correlation, suggesting that excessive social media use can detract from study time and lower grades (Kirschner & Karpinski, 2010). Other studies find no significant relationship or even positive effects when social media is used for collaborative learning and academic support. These contradictions highlight the importance of differentiating between types and purposes of social media engagement. Merely measuring time spent online is insufficient; the activities performed during that time are crucial determinants of the outcome. Furthermore, academic performance is a multidimensional

construct. While GPA provides a quantitative measure, it may not fully capture skills like critical thinking or metacognitive ability, which are also vital for long-term success. Therefore, a comprehensive study should consider both grade-based performance and self-reported learning outcomes to gain a holistic view of how social media influences academic success in biology education.

**Social Media, Metacognition and Performance: Existing Evidence**

Existing research on the intersection of social media, metacognition, and academic performance presents a complex and sometimes contradictory picture. Several studies have explored how digital distractions impair the cognitive control necessary for metacognitive regulation. For instance, the phenomenon of "media multitasking," where students switch between social media and academic work, has been shown to reduce comprehension, increase cognitive load, and impair the ability to monitor one's own understanding effectively (Rosen, Carrier, & Cheever, 2013). This fragmented attention undermines the deep processing required for metacognitive reflection and effective learning. Conversely, other strands of research suggest that social media can foster metacognitive dialogue. Educational forums and subject-specific groups provide spaces where students can articulate their understanding, ask questions, and receive feedback, all of which are metacognitive activities. This peer interaction can make thinking processes more visible and subject to refinement. A study by Mazman and Usluel (2010) found that when students used social networks for educational purposes, they reported increased sharing of knowledge and strategies, which can enhance metacognitive awareness. The key differentiator in the literature appears to be the purpose and context of use. Undirected, recreational use tends to be associated with negative outcomes, while purposeful, academically oriented use shows potential for positive effects. However, much of this evidence comes from general student populations or other disciplines. There is a scarcity of focused research on biology education students, whose learning involves specific types of content and cognitive demands. This gap necessitates a targeted investigation to determine which patterns hold true in this particular academic context and to guide appropriate pedagogical responses.

**Theoretical Framework**

This study is anchored on the Theory of Self-Regulated Learning (SRL) as proposed by Barry J. Zimmerman. Self-regulated learning theory provides a comprehensive framework for understanding how students actively control and direct their own learning processes. The theory posits that effective learners engage in a cyclical process involving three phases: forethought, performance, and self-reflection (Zimmerman, 2002). In the forethought phase, students set goals and plan their strategies. In the performance phase, they execute tasks while employing self-control and self-observation techniques. In the self-reflection phase, they evaluate their performance and make adjustments for future tasks. Metacognitive awareness is a core component of this self-regulatory cycle, as it underpins the planning, monitoring, and evaluation activities. Social media usage interacts with this cycle in multiple ways. It can be a tool that supports self-regulation, for example, when used to set up study schedules in online groups, share resources for a planned task, or seek feedback on performance. Alternatively, social media can be a disruptive force that interrupts the performance phase with distractions, impairs self-observation by dividing attention, and skews self-reflection through social comparison rather than objective assessment of learning. By applying the SRL framework, this study can systematically analyze how different social media behaviors facilitate or hinder each phase of the self-regulation process among biology students. The framework moves the analysis beyond simple correlation to a more mechanistic understanding of the influence. It

allows for the examination of whether social media use is associated with poorer goal setting, reduced strategic planning, less effective task performance, or inadequate self-evaluation. This theoretical grounding strengthens the study's design and interpretation, linking observed patterns of social media use directly to established constructs of learning self-regulation and metacognition.

**Methodology**

This study employed a convergent parallel mixed-methods research design to provide a comprehensive understanding of the research problem. The design involved the simultaneous collection of quantitative and qualitative data, with the results integrated during the interpretation phase. The study was conducted at Federal University Gashu'a, Yobe State, focusing on students enrolled in the Biology Education program across all academic levels. The target population was estimated at 450 students. A sample size of 200 students was determined using the Krejcie and Morgan sample size table and selected through stratified random sampling to ensure representation from each academic level (100-400 level). For the qualitative component, 15 students were purposively selected from the larger sample to participate in in-depth interviews based on their varying levels of social media activity as indicated in an initial screening. Quantitative data were collected using a structured questionnaire titled "Social Media Usage, Metacognition, and Academic Performance Questionnaire (SMUMAPQ)." The questionnaire had four sections: Section A collected demographic data and academic performance (self-reported CGPA). Section B measured social media usage patterns and frequency using a scale adapted from the Social Media Use Integration Scale. Section C assessed metacognitive awareness using the Metacognitive Awareness Inventory (MAI) developed by Schraw and Dennison (1994). All scales used a five-point Likert format. Qualitative data were collected through semi-structured interviews with a guide focusing on students' experiences, perceptions, and narratives regarding social media's role in their learning. The quantitative instrument was validated by two experts in educational psychology and measurement, and its reliability was confirmed through a pilot test with 30 students from a neighboring university, yielding a Cronbach's alpha coefficient of 0.87. Interview protocols were reviewed for clarity. Data collection was administered over four weeks, with questionnaires distributed in classrooms and interviews conducted in a private campus location. Quantitative data were analyzed using Statistical Package for the Social Sciences (SPSS) version 25, employing descriptive statistics (mean scores, standard deviation) for research questions and inferential statistics (Pearson correlation) for hypotheses. Qualitative interview data were transcribed verbatim and analyzed using thematic analysis to identify, analyze, and report patterns (themes) within the data, following the steps outlined by Braun and Clarke (2006).

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**Data Analysis**

**Research Question One:** What are the patterns and frequency of social media usage among Biology Education students at Federal University Gashu'a?

**Table 1: Mean Score Analysis of Social Media Usage Patterns and Frequency**

| S/N | Item | SA | A | N | D | SD | Total | x̄ |
|---|---|---|---|---|---|---|---|---|
| 1 | I use social media daily for more than 3 hours. | 85 | 70 | 25 | 15 | 5 | 755 | 3.78 |
| 2 | I primarily use WhatsApp for academic group discussions. | 70 | 65 | 40 | 20 | 5 | 705 | 3.53 |
| 3 | I use Facebook/Instagram mainly for entertainment and social news. | 110 | 60 | 15 | 10 | 5 | 785 | 3.93 |
| 4 | I check social media notifications immediately while studying. | 90 | 75 | 20 | 10 | 5 | 755 | 3.78 |
| 5 | I have used YouTube to watch biology tutorial videos in the past month. | 95 | 80 | 15 | 8 | 2 | 772 | 3.86 |

Table 1 shows high mean scores across items. Students report high daily usage (mean 3.78), with a strong inclination towards using platforms like Facebook and Instagram for entertainment (mean 3.93). There is also notable use of WhatsApp for academic purposes (mean 3.53) and YouTube for educational content (mean 3.86). The high mean for checking notifications while studying (3.78) indicates frequent multitasking.

**Research Question Two:** What is the level of metacognitive awareness among Biology Education students at Federal University Gashu'a?

**Table 2: Mean Score Analysis of Metacognitive Awareness Level**

| S/N | Item | SA | A | N | D | SD | Total | x̄ |
|---|---|---|---|---|---|---|---|---|
| 6 | I set specific goals before I start studying a biology topic. | 60 | 75 | 40 | 20 | 5 | 690 | 3.45 |
| 7 | I periodically check to see if I understand what I am reading in my biology text. | 55 | 70 | 45 | 25 | 5 | 675 | 3.38 |
| 8 | I change my study strategy if I feel it is not working for a particular biology exam. | 50 | 60 | 50 | 30 | 10 | 640 | 3.20 |
| 9 | I can accurately judge how well I understand a biology concept before a test. | 40 | 65 | 55 | 30 | 10 | 625 | 3.13 |
| 10 | After an exam, I analyze which study methods were effective or ineffective. | 45 | 60 | 50 | 35 | 10 | 630 | 3.15 |

Table 2 presents moderate mean scores ranging from 3.13 to 3.45. The highest mean is for goal setting (3.45), while the lowest is for self-assessment of understanding before a test (3.13). The results suggest a moderate level of metacognitive awareness among the students, with planning skills being relatively stronger than evaluation and judgment skills.

**Research Question Three:** What is the academic performance level of Biology Education students at Federal University Gashu'a?

**Table 3: Frequency Distribution of Self-Reported Cumulative Grade Point Average (CGPA)**

| CGPA Range | Frequency | Percentage |
|---|---|---|
| 4.50 - 5.00 (First Class) | 15 | 7.5% |
| 3.50 - 4.49 (Second Class Upper) | 65 | 32.5% |
| 2.50 - 3.49 (Second Class Lower) | 85 | 42.5% |
| 1.50 - 2.49 (Third Class) | 30 | 15.0% |
| 0.00 - 1.49 (Pass/Fail) | 5 | 2.5% |
| **Total** | **200** | **100%** |

Table 3 shows that the majority of students (42.5%) fall within the Second Class Lower division (CGPA 2.50-3.49). A combined 40% are in the upper divisions (First Class and Second Class Upper), while 17.5% are in the lower performance categories (Third Class and Pass).

**Research Question Four:** What is the relationship between social media usage patterns and the level of metacognitive awareness among students?

**Research Question Five:** What is the relationship between social media usage patterns and academic performance among students?

*(Note: Analysis for these questions is presented in the Test of Hypotheses section via correlation coefficients).*

**Research Question Six:** What are the students' perceptions of the influence of social media on their learning strategies and academic outcomes?

**Thematic Analysis of Interview Data:**

- **Theme 1: Social Media as a Double-Edged Sword.** All interviewees acknowledged both benefits and drawbacks. Benefits included instant access to peer support for difficult topics and visual learning aids from YouTube. Drawbacks centered on procrastination and the difficulty of resisting notifications during planned study time. "I join our class WhatsApp group to ask questions about assignments, which is very helpful. But then I see a meme from a friend, and I end up scrolling for an hour instead of reading," stated one 300-level student.
- **Theme 2: Impact on Depth of Learning.** Several students expressed that social media encourages superficial engagement with academic material. The habit of quickly searching for summaries or specific answers was reported to undermine deeper reading of textbooks. "Sometimes, when I find a short note on Facebook about a topic, I just read that and feel like I know it, but during the exam, I realize I don't understand the full concept," explained a 200-level student.
- **Theme 3: Erosion of Self-Regulation.** Many interviewees described a loss of control over their study time and focus. They reported failed attempts to use apps to block social media during study sessions and feeling compelled to stay online for fear of missing out on social or academic information. This aligns with challenges in the performance and self-reflection phases of self-regulated learning. "I plan to read for two hours, but my phone is always there. I tell myself I'll just check one message, and that breaks my concentration completely," shared a 400-level student.

**Test of Hypotheses**

**Hypothesis One ($H_{01}$):** There is no significant relationship between social media usage frequency and metacognitive awareness among Biology Education students.

**Table 4: Pearson Correlation between Social Media Usage Frequency and Metacognitive Awareness Score**

| Variable 1 | Variable 2 | N | r | p-value | Decision |
|---|---|---|---|---|---|
| SM Usage Frequency Score | Metacognitive Awareness Score | 200 | -0.215 | 0.002 | $H_{01}$ Rejected |

A significant weak negative correlation was found ($r = -0.215$, $p = 0.002$). This indicates that as the frequency of general social media usage increases, the level of metacognitive awareness tends to decrease slightly. Therefore, the null hypothesis is rejected.

**Hypothesis Two ($H_{02}$):** There is no significant relationship between social media usage for academic purposes and academic performance among Biology Education students.

**Table 5: Pearson Correlation between Academic-Oriented SM Use and CGPA**

| Variable 1 | Variable 2 | N | r | p-value | Decision |
|---|---|---|---|---|---|
| Academic SM Use Score | CGPA | 200 | 0.185 | 0.009 | $H_{02}$ Rejected |

A significant weak positive correlation was found ($r = 0.185$, $p = 0.009$). This suggests that higher levels of using social media for academic purposes (e.g., group discussions, accessing educational content) are associated with slightly higher academic performance (CGPA). The null hypothesis is rejected.

**Hypothesis Three ($H_{03}$):** There is no significant relationship between social media usage for non-academic purposes and academic performance among Biology Education students.

**Table 6: Pearson Correlation between Non-Academic SM Use and CGPA**

| Variable 1 | Variable 2 | N | r | p-value | Decision |
|---|---|---|---|---|---|
| Non-Academic SM Use Score | CGPA | 200 | -0.302 | 0.000 | $H_{03}$ Rejected |

A significant moderate negative correlation was found ($r = -0.302$, $p < 0.001$). This indicates that higher levels of using social media for non-academic purposes (entertainment, social networking) are associated with moderately lower academic performance. The null hypothesis is rejected.

**Discussion of Findings**

The findings of this study reveal significant insights into the digital learning landscape of Biology Education students at Federal University Gashu'a. Firstly, the patterns of social media usage confirm its entrenched role in student life, characterized by high daily engagement. The prevalent use of platforms like Instagram and Facebook for entertainment, coupled with the common behavior of checking notifications during study time, paints a picture of a student population frequently engaged in media multitasking. This aligns with global trends reported by Rosen et al. (2013), who identified such multitasking as detrimental to sustained concentration. The concurrent use of WhatsApp and YouTube for academic purposes, however, indicates a duality in how these tools are perceived and utilized, serving both as a conduit for distraction and a potential channel for collaborative learning. The level of metacognitive awareness among students was found to be moderate. While students reported some competency in planning their studies, their scores were lower on items related to self-

monitoring and self-evaluation. This suggests that students may enter study sessions with goals but are less effective at judging their own comprehension in real-time or critically assessing their strategies post-assessment. This moderate level is concerning given the demands of biology education, which requires constant adjustment of learning tactics for different types of content, from memorizing taxonomy to understanding physiological processes.

The relationship analyses provided the most compelling evidence. The weak negative correlation between overall social media usage frequency and metacognitive awareness supports the concern that habitual, high-frequency use may subtly erode the self-reflective capacity central to metacognition. This could be because constant digital interaction fosters a reactive rather than a reflective cognitive style. More nuanced results emerged when dissecting the purpose of use. The positive, albeit weak, correlation between academic-oriented social media use and CGPA offers empirical support for the potential of these platforms as supplementary learning tools. This finding resonates with the work of Mazman and Usluel (2010), who highlighted the knowledge-sharing benefits of educational social network use. Conversely, the stronger moderate negative correlation between non-academic social media use and CGPA underscores a significant risk. It suggests that leisure-oriented engagement is a more potent predictor of poorer academic outcomes than academic-oriented use is of better outcomes. This asymmetry highlights where intervention efforts should be most focused. The qualitative data enriched these quantitative findings by providing context. The thematic analysis confirmed the dual-edged nature of social media, vividly illustrating how the same tool that provides academic support also serves as the primary source of procrastination. The theme of eroded self-regulation directly links to the lower scores in metacognitive regulation, showing how students perceive their own control being undermined by digital interruptions. The reported tendency towards superficial learning aligns with the lower metacognitive judgment scores, as students may not deeply engage enough with material to accurately gauge their understanding. Together, the mixed-methods data present a coherent narrative: social media is a powerful environmental factor that interacts with learning processes, and its impact is predominantly negative when usage is not consciously directed towards academic goals, largely due to its interference with the self-regulatory cycle essential for metacognition and academic success.

**Conclusion**

In conclusion, this study has demonstrated that social media usage exerts a measurable influence on both metacognitive awareness and academic performance among Biology Education students at Federal University Gashu'a. The influence is not monolithic but varies critically with the purpose of engagement. High-frequency, general use and use for non-academic purposes are associated with lower metacognitive awareness and poorer academic performance. These patterns suggest that uncontrolled social media activity can disrupt the self-regulated learning cycle, particularly the performance and self-reflection phases, by fragmenting attention and promoting superficial engagement. On the other hand, using social media with clear academic intentions shows a positive, though modest, association with better grades, indicating its potential as a supportive tool when used strategically. The moderate levels of metacognitive awareness observed point to an area needing developmental support, irrespective of social media use. The situation in this department reflects a broader challenge in the digital age: integrating pervasive technology into effective learning ecosystems. Students are active users of technology but may lack the skills to harness it optimally for their academic advancement while mitigating its distracting potential. Therefore, addressing this issue requires

moving beyond simplistic warnings against social media use and towards equipping students with the digital literacy and self-regulation strategies necessary to navigate their online environments productively.

**Recommendations**

Based on the findings of this study, the following recommendations are made:

1. The Department of Science Education at Federal University Gashu'a should develop and integrate a Digital Literacy and Self-Regulated Learning module into the curriculum for Biology Education students. This module should explicitly teach strategies for managing digital distractions, using social media purposefully for academic collaboration, and strengthening metacognitive planning and evaluation skills.
2. University counseling and academic support units should organize workshops and awareness campaigns focused on mindful social media use. These sessions should present the study's findings to students, highlighting the differential impact of academic vs. non-academic use and providing practical tools for self-monitoring and limiting recreational use during study periods.
3. Lecturers in the Biology Education program should actively model and incorporate structured academic uses of social media into their pedagogy. This could include creating moderated course-specific groups for discussions, curating and sharing relevant educational content from platforms like YouTube, and designing assignments that require collaborative online research and critical evaluation of web-based resources.
4. Future research should expand on this study by employing longitudinal designs to track changes over time and by incorporating more objective measures of social media usage (e.g., screen-time analytics) and academic performance (official transcripts) to complement self-reported data.

**References**

Akinwumi, J. O. (2018). Digital literacy and academic performance in Nigerian universities. *Journal of Educational Technology in Nigeria*, 5(2), 45-59.

Alwagait, E., Shahzad, B., & Alim, S. (2015). Impact of social media usage on students academic performance in Saudi Arabia. *Computers in Human Behavior, 51*, 1092-1097.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77-101.

Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive–developmental inquiry. *American Psychologist, 34*(10), 906-911.

Ifinedo, P. (2016). Applying uses and gratifications theory and social influence processes to understand students' pervasive adoption of social networking sites: Perspectives from the Americas. *International Journal of Information Management, 36*(2), 192-206.

Junco, R. (2012). Too much face and not enough books: The relationship between multiple indices of Facebook use and academic performance. *Computers in Human Behavior, 28*(1), 187-198.

Kirschner, P. A., & Karpinski, A. C. (2010). Facebook® and academic performance. *Computers in Human Behavior, 26*(6), 1237-1245.

Mazman, S. G., & Usluel, Y. K. (2010). Modeling educational usage of Facebook. *Computers & Education, 55*(2), 444-453.

Rosen, L. D., Carrier, L. M., & Cheever, N. A. (2013). Facebook and texting made me do it: Media-induced task-switching while studying. *Computers in Human Behavior, 29*(3), 948-958.

Schraw, G., & Dennison, R. S. (1994). Assessing metacognitive awareness. *Contemporary Educational Psychology, 19*(4), 460-475.

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory into Practice, 41*(2), 64-70.

Zohar, A., & David, A. B. (2009). Paving a clear path in a thick forest: A conceptual analysis of a metacognitive component. *Metacognition and Learning, 4*(3), 177-195.