

Impact of Time Utilization Pattern, Social Media Usage, and the Academic Performance of Biology Undergraduate Students in Universities

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Abstract

Original Research Article

This study explored the effects of time utilization patterns and social media usage on the academic performance of biology undergraduates in Bayelsa State. A descriptive-comparative research design was adopted for the study. The study's population consisted of all biology undergraduates in tertiary institutions in the state. A simple random sampling technique was utilized to select a sample of 150 students who participated in the study. Three instruments were used for data collection, including the Time Utilization Pattern Scale (TUPS), Social Media Usage Level Scale (SMULS), and Academic Performance Scale (APS). The instruments were validated through expert review. The TUPS, SMULS, and APS had a reliability of 0.85, 0.79, and 0.81, respectively, using Cronbach's Alpha. Data was analysed using mean and standard deviation for the four research questions, and a *t-test* for the four null hypotheses at a 0.05 alpha level. The findings showed that both time utilization patterns and social media usage significantly affected students' academic performance, and that gender did not significantly affect students' achievement. It was recommended, among other things, that interventions be introduced to enhance students' time Utilization patterns and reduce social media usage.

Keywords: Time Utilization, Social Media, Academic Performance.

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INTRODUCTION

Biology is the essential element to understanding life, as it offers insights into the complexity of living organisms and their interactions with the environment. The primary functionality of the biology field lies in the knowledge it yields through study and research, which helps understand life in all forms and our surroundings (Abudulsalam *et al.*, 2020). This has made it quite essential for future developments, sustainability, and the survival of human life and other species. Biology also plays a pivotal role in fields like medicine and healthcare, contributing to the development of new treatments and therapeutic approaches (Annan *et al.*, 2019). It has also contributed to the development of several innovations in fields like agriculture, leading to the enhancement of the food production process, particularly its yield and quality (Umar, 2023). Its influence also extends to industrial fields like brewing, textiles, and garment making. Biology is also comprised of a series of branches or subfields, with each serving varying essential purposes. Biotechnology, the most recent field under the biology umbrella, for instance, has advanced civilization and

provided benefits such as increased food production, novel treatments, and improved industrial methods.

Considering the importance of biology, a good academic performance rate in the subject is of utmost importance. This is particularly true for biology students in tertiary institutions. Academic performance encompasses not just students' achievement in tests and examinations but also covers related variables influencing those outcomes, like their rate of assignments and project completion, class attendance, study habits, and overall ability to meet educational goals, among others. A solid performance rate not only reflects the students' understanding and mastery of the field but also ensures that they are well-prepared to contribute to advancements in education, scientific research, healthcare, and industry, depending on their domain of learning. Therefore, prioritizing academic excellence in biology is essential for cultivating the next generation of scientists and professionals who will drive innovation and address global challenges.

The performance rate of biology students can be actively influenced by a variety of factors or issues. Several of these issues have been identified and explored over time, ranging from the availability of instructional facilities to the instructional approach used to teach the subject (Ndayambaje *et al.*, 2021). However, comparatively less attention has been paid to more student-centred psychological or behavioural factors (that are outside classroom learning contexts), like their time management ability or time utilization patterns, and even their daily activities, like the use of social media.

Time is a valuable resource that significantly impacts productivity, well-being, and overall success. Time utilization patterns refer to how an individual allocates their time to various activities (Ferranna *et al.*, 2022). Factors influencing time utilization include academic demands, personal habits, technological distractions, social life, personal goals, psychological factors, and life events and changes. Efficient time utilization involves proactive planning, which involves setting clear goals, creating schedules, and prioritizing tasks ahead of time (Reed, 2024; RmLeigh, 2023). Time utilization, as earlier noted, can affect students' learning outcomes in biology, as every activity in life is a function of time, including the academics of students. For one thing, proper time Utilization allows students to allocate sufficient time for academic tasks, such as studying and completing assignments, and have less stress and anxiety (Gallardo-Lolandes *et al.*, 2020; Ghiasvand *et al.*, 2017), which is likely to reflect positively on their academic performance. Students with poor time utilization patterns are likely to struggle with prioritization, may spend excessive time on less critical tasks, leaving insufficient time for more important academic responsibilities. Efficient time management is also essential for striking a balance between academic work and other aspects of life, ensuring they receive their due attention.

Social media use is the other factor considered in this study, which may have an effect on students' performance in biology. Social media is a popular online tool that has revolutionized communication, interaction, and information sharing (Leonardi, 2017). It allows users to connect with others in a network, and has grown to become integral to daily life, influencing personal relationships and global politics. Despite its benefits, social media also poses significant challenges, including exacerbating some mental health issues, the spread of misinformation, privacy concerns, and hampering real-world interactions, among others (Aimeur *et al.*, 2023; Hernández-García, 2018; Keles *et al.*, 2020). Social media use, particularly when it moves to excessive levels, can have some negative implications for students' learning. It can, among others, impede attention span, impair memory retention, facilitate procrastination, disrupt time management abilities, and hamper sleep patterns (Husain *et al.*, 2024; Waheed *et al.*, 2021; Shanmugasundaram&Tamilarasu, 2023; Sumen&Evgin,

2021), all of which mitigate meaningful and effective engagement in studies. Social media overuse can also lead to increased anxiety and stress, which is another issue that is not beneficial to learning.

Other than time management and social media, students' performance can be further influenced by some other variables, which can also influence the effects of those variables on the academic performance of students. One such variable is the gender of the students. Gender differences in education are complex and can be influenced by biology, cultural norms, societal expectations, and personal experiences. On the biological domains are differences in cognitive abilities and functions between the genders. Like how Esipenko *et al.*, (2018) and Yoon & Mann (2017) reported gender differences existing in spatula skills, and also gender differences in verbal skills as reported by Aucejo& James (2021) and Izzaty&Setiawati (2019). These differences can influence students' aptitudes and success in different subjects. Societal expectations and cultural norms, such as gender stereotypes, can also contribute to these differences in academic performance (Gonzalez *et al.*, 2019; Nnamani&Oyibe, 2016). These stereotypes can create a ripple effect, with each gender receiving more attention and success in subjects considered more appropriate for their gender. This can lead to less interest in subjects considered inappropriate for their gender, affecting academic performance. In a society where one gender is considered superior, the other may have low expectations for success in that field and may perceive it as of little relevance to them. Gender can also influence students' time utilization and management patterns (Rani & Sharma, 2018) and their social media use (Choudhury & Ali, 2020).

METHODS

Research Design

This study adopted the descriptive-comparative design. This design was used to document the current status of students' time management abilities and social media usage, as well as their perceived academic achievement, and the relationships among variables.

Population of the Study

The population of this study consisted of undergraduate students studying biology in tertiary institutions in Bayelsa State.

Sample and Sampling Techniques

A simple random sampling technique was used to select the participants for the study from the population. A total of 150 students were selected to participate in the study.

Data Collection Instrument

For data collection purposes, three instruments were used in this study, including: Time Utilisation

Pattern Scale (TUPS), Social Media Usage Level Scale (SMULS), and Academic Performance Scale (APS)

Time Utilization Pattern Scale (TUPS)

This was a researcher-designed instrument that was used to measure how students utilize their time, particularly their time management ability in academic contexts. The instruments were made up of two sections. The first section collected students' demographic information as well as a serial number assigned by the researcher for easy linking to the other instruments in the study. The second section was comprised of items specifically designed to measure the extent to which students engage in behaviours that would indicate good time utilization. The instrument was constructed on a 4-point scale. The instrument was used to sort the study's participants into groups of good and poor time utilization patterns based on their mean score, where only students scoring above 2.5 were considered to have good time utilization patterns.

Social Media Usage Level Scale (SMULS)

This instrument is similar to the TUPS, but was used to measure the extent to which students make use of social media. This instrument was also researcher-designed. It was comprised of two sections. The first section collected the serial number, which was used to link the outcomes of this instrument to the other instruments in the study. The second section was constructed on a 4-point scale of Strongly Agree (SA) = 4, Agree (A) = 3, Disagree (D), and Strongly Disagree (SD). This instrument was used to sort the respondents into categories of those with high and low social media usage levels, based on their mean scores.

Academic Performance Scale (APS)

This instrument was used to measure the academic achievement of students based on their

perceptions or ranking of their achievement level. Just like the other instruments, it was comprised of two sections. The first section has an area for a serial number to link to the other instrument. The second section measured the students' perceptions of their academic achievement and was constructed on a 4-point Likert scale.

Validity of the Instrument

All of the instruments received face and content validity by an expert in science education, measurement, and evaluation.

Reliability of the Instrument

To establish the reliability of the instruments, the TUPS, SMULS, and APS were administered to 30 tertiary education students who were not part of the study. The collected data were analysed using Cronbach's alpha to ascertain the internal consistency of the items and thus establish the instrument's reliability. This yielded a reliability coefficient of 0.85, 0.79, and 0.81 for the TUP, SMULS, and APS, respectively.

Method of Data Collection

The researcher directly administered the instruments to the respondents. All of the instruments were retrieved the same day to ensure a complete retrieval rate.

Data Analysis

Mean and standard deviation were used to analyse the four research questions, while the t-test was used for the null hypotheses.

RESULTS

Demographic Variables

Table 1: Distribution of Respondents by Gender

Gender	Number of Respondents	Percentage
Male	71	47.33
Female	79	52.67
Total	150	100

Table 1 shows the distribution of the study's respondents by their gender. The table shows that 71 (47.33%) of the respondents were male students, while 79 (52.67%) were female students. A total of 150 students participated in the study.

Research Questions

Research Question One: What is the mean academic performance score of biology undergraduates with high and low time utilization efficiency?

Table 2. Time utilization patterns

Time Utilization Patterns	N	Mean Performance Score	
		Mean	SD
High (≥ 2.5 mean score in TUPS)	61	2.64	0.58
Low (< 2.5 mean score in TUPS)	89	2.31	0.47
Total	150	2.45	0.54

Summary of mean and standard deviation of mean performance scores of biology undergraduates with high and low time utilization efficiency.

Table 2 shows that students with high time utilization efficiency had a greater mean performance score (M = 2.64, SD = 0.58) than those with low time utilization efficiency (M = 2.31, SD = 0.47).

Consequently, the t-test was carried out to ascertain if the observed difference was statistically significant.

Research Question Two: What is the mean academic performance score of biology undergraduates with high and low social media usage?

Table 3: Social Media Usage

Social Media Usage	N	Mean Performance Score	
		Mean	SD
High (≥ 2.5 in SMUS)	92	2.23	0.45
Low (< 2.5 in SMUS)	58	2.78	0.50
Total	150	2.45	0.54

Summary of mean and standard deviation of academic performance scores of students with high and low social media usage levels.

Table 3 shows that students with a low level of social media usage had a greater mean performance score (M = 2.78, SD = 0.5) than those with a high level of social media usage (M = 2.23, SD = 0.45). Consequent upon the observed difference, the t-test was carried out to ascertain the significance of the difference.

Research Question Three: What is the mean academic performance score of male and female biology undergraduates with high and low time utilization efficiency?

Table 4: Time utilization patterns among male and female participants

Time Utilization Patterns	Gender	N	Mean Performance Score	
			Mean	SD
High (≥ 2.5 mean score in TUPS)	Male	28	2.55	0.64
	Female	33	2.72	0.52
	Total	61	2.64	0.58
Low (< 2.5 mean score in TUPS)	Male	42	2.34	0.44
	Female	47	2.28	0.49
	Total	89	2.31	0.47
Total	Male	71	2.43	0.54
	Female	79	2.46	0.54
	Total	150	2.45	0.54

Summary of mean and standard deviation of mean achievement scores of male and female biology undergraduates with high and low time utilization efficiency.

Table 4 shows that for students with a high level of time utilization pattern efficiency, the mean performance score of female students (M = 2.72, SD = 0.52) was greater than that of male students (M = 2.55, SD = 0.64). However, for students with low time utilization pattern efficiency, the mean performance score of male students (M = 2.34, SD = 0.44) was greater than that of female students (M = 2.28, SD = 0.49). The table further shows that the total mean performance score

of female students (M = 2.46, SD = 0.54) was greater than that of male students (M = 2.43, SD = 0.54). Consequently, the t-test was carried out to ascertain if the observed differences were statistically significant.

Research Question Four: What is the mean academic performance score of male and female biology undergraduates with high and low social media usage?

Table 5: Social Media Usage among male and female participants

Social Media Usage	Gender	N	Mean Performance Score	
			Mean	SD
High (≥ 2.5 in SMUS)	Male	45	2.22	0.39
	Female	47	2.24	0.5
	Total	92	2.23	0.45
Low (< 2.5 in SMUS)	Male	25	2.79	0.57
	Female	33	2.77	0.45
	Total	58	2.78	0.50
Total	Male	71	2.43	0.54
	Female	79	2.46	0.54
	Total	150	2.45	0.54

Summary of mean and standard deviation of academic performance scores of male and female biology undergraduates with high and low social media usage levels.

Table 5 shows that for students with a high social media usage level, the mean performance score of female students ($M = 2.24$, $SD = 0.5$) was greater than that of male students ($M = 2.22$, $SD = 0.39$). However, for students with low social media usage levels, the mean performance score of male students ($M = 2.79$, $SD = 0.57$) was greater than that of female students ($M = 2.77$, $SD = 0.45$). Consequently, the t-test was carried out to

ascertain if the observed difference was statistically significant.

Study Hypotheses

Null Hypothesis One: There is no statistically significant difference in the mean academic performance score of biology undergraduates with high and low time Utilization efficiency.

Table 6: t-test analysis of time utilization

Time Utilization	N	Mean	SD	df	t-value	Sig (p)	Decision
High	61	2.64	0.58	148	3.817	.000	Significant ($p < 0.05$)
Low	89	2.31	0.47				

Summary of t-test analysis of the difference in the mean achievement scores of biology undergraduates with high and low time utilization efficiency.

The result in Table 6 shows that their students with high time utilization efficiency had a significantly greater mean performance score than those with low time utilization efficiency, $t(148) = 3.817$, $p = .000$. Thus, the null hypothesis which states that "there is no statistically significant difference in the mean academic performance

score of biology undergraduates with high and low time utilization efficiency" was rejected.

Null Hypothesis Two: There is no statistically significant difference in the mean academic performance score of biology undergraduates with high and low social media usage.

Table 7: t-test analysis of social media usage

Social Media Usage	N	Mean	SD	df	t-value	Sig (p)	Decision
High	92	2.23	0.45	148	-7.006	.000	Significant ($p < 0.05$)
Low	58	2.78	0.50				

Summary of t-test analysis of the difference in the performance score of students with high and low social media usage levels.

The result in Table 7 shows that students with low social media usage level had a significantly greater mean performance score than those with high social media usage, $t(148) = -7.006$, $p = .000$. Thus, the null hypothesis which states that "there is no statistically significant difference in the mean academic performance score of biology undergraduates with high and low social media usage" was rejected.

Null Hypothesis Three: There is no statistically significant difference in the mean academic performance score of male and female biology undergraduates with high and low time Utilization efficiency.

Summary of t-test Analysis of the Difference in the Mean Achievement Scores of Male and Female Biology Undergraduates with High and Low Time Utilization Efficiency

Table 8: t-test analysis of time utilization by gender

Time Utilization	Gender	N	Mean	SD	df	t-value	Sig (p)	Decision
High	Male	28	2.55	0.64	59	-1.122	.266	NS ($p > 0.05$)
	Female	33	2.72	0.52				
Low	Male	42	2.34	0.44	87	.596	.553	NS ($p > 0.05$)
	Female	47	2.28	0.49				
Total	Male	71	2.43	0.54	148	-.416	.678	NS ($p > 0.05$)
	Female	79	2.46	0.54				

The result in Table 8 shows that for students with high time Utilization efficiency, there is no significant difference in the mean performance score of male and female students, $t(59) = -1.122$, $p = .266$. The table also shows that for students with low time Utilization efficiency, there is no significant difference in the mean performance score of male and female students, $t(87) = .596$, $p = .553$. This, the null hypothesis, which states that "there is no statistically significant

difference in the mean academic performance score of male and female biology undergraduates with high and low time Utilization efficiency," was rejected.

Null Hypothesis Four: There is no statistically significant difference in the mean academic performance score of male and female biology undergraduates with high and low social media usage.

Table 9: t-test analysis of social media usage by gender

Social media usage	Gender	N	Mean	SD	df	t-value	Sig (p)	Decision
High	Male	45	2.22	0.39	90	-.225	.823	NS (p > 0.05)
	Female	47	2.24	0.5				
Low	Male	25	2.79	0.57	56	.131	.896	NS (p > 0.05)
	Female	33	2.77	0.45				
Total	Male	71	2.43	0.54	148	-.416	.678	NS (p > 0.05)
	Female	79	2.46	0.54				

Summary of t-test Analysis of the Difference in the Academic Performance Score of Male and Female Biology Undergraduates with High and Low Social Media Usage Level

Table 9 shows that for students with high social media usage, there is no significant difference in the mean performance score of male and female students, $t(90) = -.225$, $p = .823$. The table also shows that for students with low social media usage, there is no significant difference in the mean performance score of male and female students, $t(56) = .131$, $p = .896$. Thus, the null hypothesis, which states that "there is no statistically significant difference in the mean academic performance score of male and female biology undergraduates with high and low social media usage," was rejected.

DISCUSSION

Time Utilization and Students' Biology Performance

The study's findings show that the biology undergraduate students with good time Utilization patterns had a significantly better mean academic performance score than those with poor time Utilization patterns. This finding agrees with that of Khanam *et al.*, (2017), who assessed the time management skill and perceived academic achievement of university students and reported that participants who obtained higher achievement scores also had a high mean score on general time management.

Nigussie (2019), who assessed the effect of time management practice on the academic achievement of students in Dire Dawa University, Ethiopia, reported that time management and all its dimensions significantly influenced students' academic achievement, and the better the students time management behaviour, the higher the students CGPA. The finding also agrees with Razali *et al.*, (2018), who assessed the relationship between time management practices and academic performance among university students at a university in Malaysia and reported that all time management behaviours were positively related to academic achievement, even though the relationship was weak. The study findings further coincide with those of Ahmad *et al.*, (2019), who explored the path relationship of time management and the academic achievement of students in a distance learning institution and reported that there is a strong positive relationship between time management and academic achievement of the students.

The high rate of previous studies that agree with this study indicates enough evidence of the role that time plays in academic performance, even though those previous studies were focused on different measures of time (particularly general time management skills rather than time Utilization patterns in the context of academics). This finding is to be expected as academic activities, just like reading, completing assignments, and projects, are intensive endeavours that require a significant amount of time. When paired with other non-academic activities that also require time, students will likely be unable to meet up with their academic responsibilities unless they are able to utilise the available time properly.

Social Media and Students' Performance

The findings of this study showed that biology undergraduates with low social media usage had significantly greater mean performance scores than those with high social media usage. This finding agrees with that of Leyrer-Jackson & Wilson (2017), who assessed the associations between social-media use and academic performance among undergraduate students in the USA who were enrolled in biology-related courses. The findings of the study showed that the students' GPA negatively correlated with the number of social-media websites to which students subscribe. The finding also coincides with that of Shen (2019), who assessed social-media use and academic performance among biology undergraduates in a University in China and reported that GPA is inversely related to the number of social media applications that students use.

The study by Mbajiorgu *et al.*, (2018) is also in line with this finding. The study explored the relationship between some Nigerian secondary school students' usage of Social Networking Sites (particularly whether they use it or not) and their achievement in biology and reported that there was a statistically significant difference between users and non-users of SNS, suggesting that, indeed, usage of SNS affects achievement negatively. However, the findings of this study disagree with those of Oguguo *et al.*, (2020), who assessed the influence of social media on senior secondary school students' academic achievement and reported that there was no significant influence of

frequency of social media use by students on their mean academic achievements in accounting.

Considering the majority of agreeing reports from previous studies, one can reasonably assume that social media exhibits some effects on academic performance in various contexts to some extent. Various factors might have led to the one contrasting study by Oguguo *et al.*, (2020). For one thing, the difference in results might have occurred due to differences in the scope of that study and this study. Unlike this study, which was set in tertiary institutions, the contrasting study was set in secondary schools, which might suggest that the effects of social media on achievement are more prominent in tertiary education students than in secondary school students. This stronger effect might be because tertiary education students are likely to have easier access to social media, with them owning their own devices, as well as resources to purchase connectivity to the internet.

Notably, another study set in a secondary school (Mbajiorgu *et al.*, 2018) did agree with these study findings. However, it is important to point out that the agreeing study did not measure the level of usage of social media, but was instead set on an explicit line on whether the students used social media or not. The finding might have been similar to Oguguo *et al.*, (2020) if it had focused on usage level instead.

Gender and the Effects of Time Utilization Patterns on Students' Biology Performance

The findings of this study showed that there is no statistically significant difference between the mean performance score of male and female biology undergraduates with good and poor time utilization patterns. This finding agrees with that of Razali *et al.*, (2018) and Nigussie (2019), who assessed the relationship between time management practices and academic performance among university students at a university in Malaysia and reported that there are no significant differences in time management behaviours based on gender. The finding also agrees with that of Khanam *et al.*, (2017), which assessed the time management skill and perceived academic achievement of university students and reported that gender difference was not statistically significant.

Gender and the Effects of Social Media on Students' Biology Performance

The findings of this study showed that there is no statistically significant difference between the mean performance score of male and female biology undergraduates with high and low social media usage. The finding agrees with that of Oguguo *et al.*, (2020), who assessed the influence of social media on senior secondary school students' academic achievement and reported that the gender of the students had no significant influence on students' mean academic achievement.

The finding disagrees with that of Leyrer-Jackson & Wilson (2017) and Shen (2019), who assessed the associations between social-media use and academic performance among undergraduate students. The studies reported significant gender differences.

CONCLUSION

Based on the findings of this study, it can be concluded that time utilization patterns and social media usage significantly influence students' performance in biology. Thus, there is a need to enhance time utilization while mitigating the use of social media. Gender does not influence students' performance in biology. Thus, male and female students learn similarly, without considerable differences between them.

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