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# SOCIAL MEDIA PLATFORMS AND MATHEMATICS ACHIEVEMENT AMONG UNIVERSITY STUDENTS: A CASE STUDY OF BUSITEMA UNIVERSITY, FACULTY OF SCIENCE AND EDUCATION

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**BU/UP/2023/1769**

**A RESEARCH REPORT SUBMITTED TO THE DEPARTMENT OF MATHEMATICS, FACULTY OF SCIENCE AND EDUCATION, BUSITEMA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF SCIENCE EDUCATION IN MATHEMATICS AND ECONOMICS**

**AUGUST 2026**

**CERTIFICATION**

This is to certify that this research was carried out by Nakku Joanitah with registration number BU/UP/2023/1769 under my supervision.

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Signature: _____

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***DECLARATION***

I, Nakku Joanitah, declare that this research report titled "Social Media Platforms and Mathematics Achievement Among University Students: A Case Study of Busitema University, Faculty of Science and Education" is my original work. It has not been submitted previously to Busitema University or any other institution of higher learning for the award of any degree, diploma, or academic certificate. All sources of information, references, and secondary literature cited herein have been duly acknowledged.

Signature: 

NAKKU JOANITAH

BU/UP/2023/1769

Date: 30th/08/2026

## *DEDICATION*

This work is dedicated to my beloved family for their endless unconditional love, financial sacrifices, continuous prayers, and unwavering faith in my academic journey, my Classmates and Friends who shared the study materials, encouraging words, and collaborative discussions throughout our time in the Faculty of Science and Education at Nagongera Campus.

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**ABSTRACT**

This study examined social media platforms and mathematics achievement among university students: A case study of Busitema University, Faculty of Science and Education. Adopting a quantitative, cross-sectional descriptive survey design, the study targeted a population of 850 mathematics education students. A representative sample of 272 students was selected using simple random sampling, and data was collected via structured self-reported questionnaires.

Descriptive analysis revealed that WhatsApp and YouTube were the most frequently used social media platforms for academic and non-academic activities whereas the inferential analysis using a simple linear regression model ($Y = \beta_0 + \beta_1 X + \varepsilon$) demonstrated a statistically significant negative relationship between average daily hours spent on social media (X) and students' final mathematics percentage grades (Y). The model accounted for approximately 26.16% of the variance in mathematics achievement ($R^2 = 0.2616$, $F(1, 270) = 97.7$, $p < .001$) where the slope coefficient ($\beta_1 = -2.3725$) indicated that for every additional hour spent daily on social media platforms, a student's mathematics percentage score decreased by 2.37 percentage points.

Consequently, the null hypothesis ($H_0$) was rejected. The study concluded that excessive, unguided daily social media usage duration displaces essential self-regulated study and practice intervals, thereby lowering mathematics performance. It is recommended that the faculty of science and education establish structured digital time-management guidelines and integrate academically focused online peer-learning groups to mitigate social media induced cognitive distraction, guide students toward video tutorial usage and establish self-regulatory frameworks to limit daily recreational screen time.

# CHAPTER ONE

# INTRODUCTION

## 1.1 Background of the Study

The use of social media has become prevalent among university students worldwide. Social media can be defined as digital platforms that enable users to create, share, and exchange content as well as interact and collaborate with others within virtual communities and networks. Among the commonly used social media platforms in Uganda are TikTok, WhatsApp Messenger, YouTube, Instagram, X (also known as Twitter), and Telegram, with recent research indicating that WhatsApp has the most users in Uganda.

In spite of the fact that Busitema University Faculty of Science and Education puts emphasis on equipping students with knowledge and skills in science and Information Communication Technology, it is still a mystery whether social media use among students at this faculty is a net positive. Mathematics, being a basis for all science disciplines, requires a deep understanding of concepts, intense practice, as well as problem-solving skills. This makes several students always turn to social media platforms like YouTube, which offers a wide range of tutorials in complex mathematical course units such as functional analysis, real analysis, and many more to support and supplement what they are taught in normal lectures.

The integration of social media platforms into higher education has transformed academic environments globally, shifting these platforms from simple networking tools into informal digital learning environments (Kaplan & Haenlein, 2010; Selwyn, 2012). Social media can be defined as interactive, web-based applications that enable users to create, share, and exchange user-generated content while collaborating within virtual networks (Obar & Wildman, 2015). Across African higher education institutions, mobile-first social media platforms have increasingly served to supplement physical instructional materials and bridge resource gaps (Tess, 2013). In Uganda, digital engagement among university students is dominated by platforms such as WhatsApp, TikTok, YouTube, Instagram, X (formerly Twitter), and Telegram, with WhatsApp maintaining the highest overall user penetration across tertiary institutions (Uganda Communications Commission [UCC], 2023).

Despite the growing emphasis on Information and Communication Technology (ICT) integration in Ugandan higher education, the net educational impact of self-directed social media use remains a subject of academic debate. At Busitema University's Faculty of Science and Education, training students with strong ICT competencies is a priority, yet whether student engagement with social media yields a net positive contribution to learning outcomes remains uncertain. Abstract disciplines such as Mathematics place unique cognitive demands on learners, requiring deep conceptual understanding, sustained problem-solving skills, and rigorous practice (Tall, 2008). Consequently, undergraduate students frequently utilize video-based platforms like YouTube to access supplementary visual tutorials in complex courses,

including Real Analysis and Functional Analysis (Mulenga & Marbán, 2020). While these platforms offer accessible learning support, the unguided nature of social media engagement presents an ongoing tension between informal educational utility and cognitive distraction (Kirschner & Karpinski, 2010).

## 1.2 Problem Statement

Even though social media platforms can be great learning tools, there has been a growing concern at Busitema University, especially in mathematics students at the faculty of science and education, about whether the amount of time the students spend on social media is mainly used for academic purposes or for non-academic stuff. Mathematics achievement calls for intense focus, yet a lot of students are increasingly distracted by non-academic social media use. If this trend is not regulated, it is most likely to compromise the quality of graduates produced at the end of the course, yet they are the ones expected to lead STEM education in Uganda. Currently, there is a gap in localized research at the faculty that quantifies the relationship between specific social media use patterns and specific mathematics grades.

## 1.3 Objectives of the Study

### *1.3.1 General Objective*

To examine social media platforms on mathematics achievement among students of Busitema University at the Faculty of Science and Education.

### *1.3.2 Specific Objectives*

1. To identify the most commonly used social media platforms for academic and non-academic purposes among mathematics students at Nagongera campus.

2. To examine the relationship between time spent on social media and students' achievement in mathematics courses using simple linear regression.

## 1.4 Research Questions

1. Is there any significant correlation between daily social media usage duration and students' test scores in mathematics?

2. Which social media platforms do mathematics students at FSE use most for academic and nonacademic purposes?

## 1.5 Research Hypothesis

*$H_0$ (Null Hypothesis*): There is no significant relationship between daily social media usage and student test scores in mathematics.

*$H_1$ (Alternative Hypothesis):* There is a significant relationship between daily social media usage and student test scores in mathematics.

## 1.6 Significance of the Study

To students: It will provide self-awareness regarding their digital habits and academic achievement.

To lecturers: It will enable lecturers of Busitema University to understand the influence of social media platforms on the students' achievements and guide them about the proper use of social media in their academics

## 1.7 Scope of the Study

This research study focuses on the influence of social media platforms on mathematics achievement. It was conducted on undergraduate mathematics education students of Busitema University at the Faculty of Science and Education, Nagongera campus.

## 1.8 Operational Definition of Terms

Social media: Digital platforms that enable users to create, share, and exchange content as well as interact and collaborate with others within virtual communities and networks.

Social Media Usage: The isolated independent variable (X), operationalized as the continuous average number of hours a student actively spends daily on digital platforms.

Mathematics Achievement: The dependent variable (Y), operationalized as the continuous numerical final percentage grade attained by the student in their most recent university mathematics course unit.

# CHAPTER TWO

# LITERATURE REVIEW

Mathematics education has traditionally relied on "chalk and talk" methods. However, the shift toward blended learning at Busitema University has introduced social media as a "shadow curriculum". As the university provides learning management systems (LMS), students often migrate to social media platforms for real-time problem solving, which makes these apps a critical variable in academic achievement.

## 2.1 The Dual Nature of Social Media: Conservative vs. Disruptive

Research by Moghavvemi et al. (2018) indicates that platforms like YouTube serve as powerful visual-spatial aids. In mathematics, where complex concepts like real analysis and functional analysis are difficult to understand, video tutorials provide a step-by-step support that cannot be easily found in textbooks. Conversely, Junco (2012) found a strong negative correlation between frequent Facebook/WhatsApp use during study sessions and overall GPA. This is particularly detrimental to mathematics, which requires high concentration that is broken every time the student checks notifications.

## 2.2 Social Constructivist Learning Theory

Social Constructivist Learning Theory explains that learning occurs through interaction, collaboration, and shared experiences. In the digital era, social media platforms function as informal learning environments where students actively construct knowledge. Some studies show that social media enhances collaborative learning, engagement, and access to academic content, which can improve academic performance. Similarly, Galindo-Dominguez et al. (2024) found that digital platforms support critical thinking and problem-solving skills, which are essential for mathematics learning. In Uganda, Tuhumwire (2024) found that university students frequently use social media for academic discussions and sharing learning materials, suggesting its positive role in learning. This implies that when used for academic purposes, social media can improve mathematics achievement through interaction and access to learning resources.

## 2.3 Time Displacement and Cognitive Distraction Theory

Time Displacement Theory argues that time spent on social media reduces time available for academic work, while Cognitive Distraction Theory highlights the negative effects of divided attention. Zerrouk et al. (2026) argue that excessive social media use is associated with lower academic performance and also high levels of usage lead to reduced concentration and academic engagement. Herrera et al. (2026) reinforce that multi-tasking negatively affects learning outcomes and productivity. All these indicate that excessive or non-academic use of social media can negatively affect mathematics achievement.

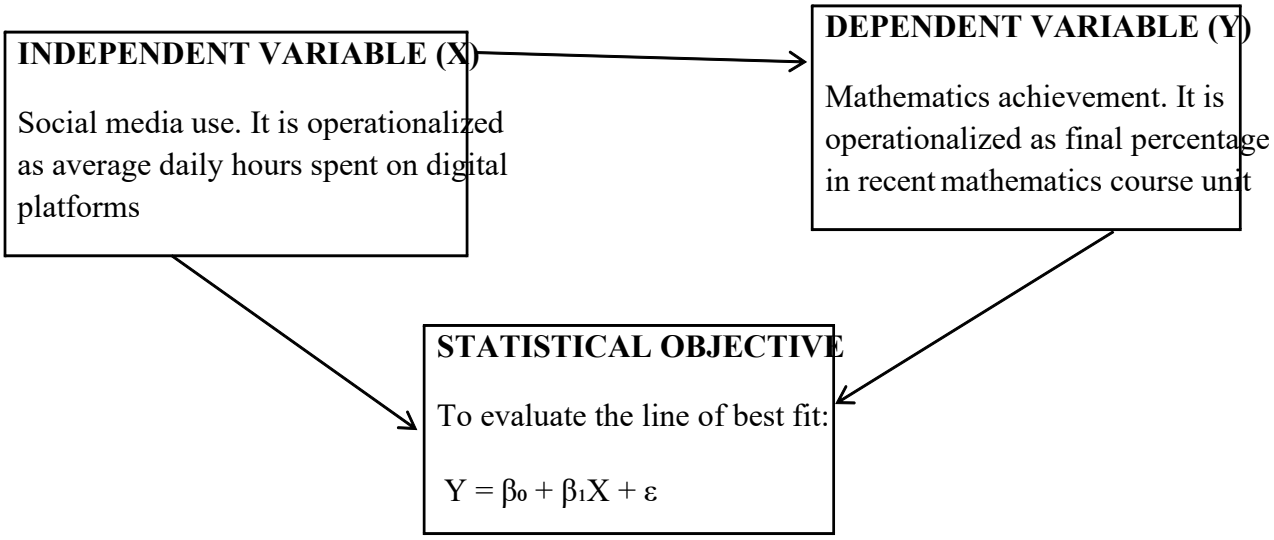
## 2.4 Contemporary Perspective

Individuals use media based on their needs, such as learning, entertainment, or social interaction, where academic use of social media improves performance whereas entertainment-based use may reduce academic outcomes. Also, in Uganda, Tuhumwire (2024) found that students who use social media for academic purposes perform better than those who use it mainly for leisure. This means that the effect of social media on mathematics achievement depends on how students use it.

## 2.5 Conceptual Framework

The relationship between the independent variable (social media usage) and the dependent variable (mathematics achievement) was conceptualized as a direct, linear interaction where the Independent Variable (X) was operationalized as the continuous average number of hours a student spends daily on platforms, while the Dependent Variable (Y) was operationalized as the continuous numerical final percentage grade attained by the student in their most recent mathematics course unit.

The core assumption of this framework is grounded in Time Displacement Theory, suggesting that an increase in time allocated to non-academic activities directly displaces time that could otherwise be dedicated to self-regulated study and practice in mathematics. By focusing strictly on these two continuous variables, the framework establishes a clean causal pathway suitable for predictive modeling.




The isolated linear interaction is modeled using the simple linear regression equation:

$$Y = \beta_0 + \beta_1 X + \varepsilon$$

The Intercept ($\beta_0$): Represents the theoretical baseline mathematics achievement score of a student who spends zero hours on social media.

The Slope ($\beta_1$): Indicates the exact rate at which a student's mathematics percentage score is expected to change for every additional hour spent on social media per day.

The Error Term ($\varepsilon$): Acknowledges external variances (e.g., class attendance, background preparation) that prevent a perfectly rigid correlation.

## CHAPTER THREE

## RESEARCH METHODOLOGY

### 3.1 Research Design

This study adopted a quantitative, cross-sectional descriptive survey design. This design was opted for because it made it possible for the researcher to obtain data through a standardized procedure based on a highly structured instrument, allowing for inferential predictive modeling between continuous variables rather than relying solely on descriptive frequencies.

### 3.2 Study Area

The study was conducted at Busitema University Faculty of Science and Education, which is located in Nagongera village in Tororo district in Eastern Uganda. It focuses on science education and ICT in education, training future science and mathematics teachers for secondary utilization

### 3.3 Target Population

The target population comprised all undergraduate students at the Faculty of Science and Education enrolled in the program of mathematics education, i.e., from Year One to Year Three. According to the university records, the estimated number of students for mathematics education was approximately 850.

### 3.4 Sample Size and Sampling Technique

Out of the total target population of 850 students within the Faculty of Science and Education, a representative sample size was determined using Slovin's Formula:

$$\boldsymbol{n = \frac{N}{1+(e^2)}},$$

Where:

N = 850 (Target population),

e = 0.05 (Margin of error at a 95% confidence interval),

$$n = \frac{850}{1+850(0.05^2)} = \frac{850}{1+850(0.0025)} = \frac{850}{3.125} = 272.$$

Therefore, a sample size of 272 students was targeted and sampled for this study to ensure statistical validity and minimize error margins.

A Simple Random Sampling technique was utilized to select the participants from the departmental records, ensuring that every individual had an equal, independent probability of inclusion.

### 3.5 Variables

Independent variable (X): Social media usage, measured as continuous average hours spent per day.

Dependent variable (Y): Mathematics achievement, measured as the continuous numerical final percentage score in the most recent course unit.

### 3.6 Data Collection Instruments

A standard, well-structured, self-administered questionnaire was used, which was based on existing validated instruments from previous empirical studies. The instrument captured continuous academic grades and precise daily hours along with categorical usage details.

### 3.7 The model

Quantitative data collected from the questionnaires was cleaned, screened and processed using Microsoft excel. To test the hypothesis and determine the precise influence of the independent variable on the dependent variable, a Simple Linear Regression analysis was conducted, and the relationship was modeled using the following equation:

$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$

$Y_i$ represents the continuous final percentage score in mathematics for respondent $i$,

$X_i$ represents average daily hours spent on social media by respondent $i$ $\beta_0$

represents the intercept (baseline score when $X=0$), $\beta_1$ represents the slope

coefficient (change in score per additional daily hour), and $\varepsilon_i$ represents the

random error term.

If $\beta_1$ was negative, it verified that more hours spent on social media reduced performance otherwise, more hours spent on social media improved performance.

### *3.7.1 Mathematical Formulas for Parameter Estimation*

The parameter estimates and diagnostic statistics generated by the software were computed using the following explicit mathematical estimators:

1. Slope coefficient ($\beta_1$)

It was calculated using the method of Ordinary Least Squares (OLS) to represent the covariance between usage hours and mathematics achievement, measured as the continuous numerical final percentage score in the most recent course unit normalized by the variance of usage hours:

$$\beta_1 = \frac{\sum_{i=1}^{n}(X_i - \bar{X})(Y_i - \bar{Y})}{\sum_{i=1}^{n}(X_i - \bar{X})^2}$$

2. Intercept coefficient ($\beta_0$)

   It derived the expected baseline mathematics achievement score when daily social media usage equals to zero hours:

   $\beta_0 = \bar{Y} - \beta_1 \bar{X}$

3. Coefficient of determination($R^2$)

   It measured the proportion of total variance in mathematics achievement scores explained by daily social media duration:

   $R^2 = \frac{SS_{regression}}{SS_{total}} = \frac{\sum_{i=1}^{n}(\hat{Y}_i - \bar{Y})^2}{\sum_{i=1}^{n}(Y_i - \bar{Y})^2}$, where $SS_{regression}$ represents the Regression Sum of Squares (the proportion of total variation in Y explained by the linear relationship with X), and $SS_{total}$ represents the Total Sum of Squares (the total variability in mathematics percentage scores around the mean $\bar{Y}$)

4. *t*-Statistic for Hypothesis testing

   It tested the statistical significance of the slope coefficient $\beta_1$ against $H_0$: $\beta_1 = 0$:

$$t = \frac{\beta_1}{SE(\beta_1)}$$

where the standard error of the slope coefficient, $SE(\beta_1)$, was computed as:

$$SE(\beta_1) = \frac{\sqrt{\frac{\sum_{i=1}^{n}(Y_i - \hat{Y}_i)^2}{n-2}}}{\sqrt{\sum_{i=1}^{n}(X_i - \bar{X})^2}} = \frac{\sqrt{\frac{SS_{error}}{n-2}}}{\sqrt{\sum_{i=1}^{n}(X_i - \bar{X})^2}}$$, where, $Y_i$ is the observed mathematics achievement for student $i$ , $\bar{Y}$ is the overall sample mean of mathematics achievement across all 272 students, $\hat{Y}_i$ is the predicted mathematics achievement for student $i$ calculated from the fitted regression equation and $SS_{error} = \sum_{i=1}^{n}(Y_i - \hat{Y}_i)^2$ represents the Residual Sum of Squares (unexplained variance between observed test scores $Y_i$ and predicted model values $\hat{Y}_i$).

### 3.7.2 *Computational Matrix Table Template*

To illustrate how raw data points collected from the sampled *n = 272* students transform into the requisite Sum of Squares (*SS*) and Standard Errors (*SE*) for regression parameters, the field data was structured using the computational matrix shown below:

***Table 3.7.3: Computational Matrix Tables Structure***

*Table 3.7.3a : Computational Input Matrix*

| Respondent($i$) | Daily Hours ($X_i$) | Math Score ($Y_i$) | $(X_i - \bar{X})$ | $(X_i - \bar{X})^2$ | $(Y_i - \bar{Y})$ |
|---|---|---|---|---|---|
| Student 1 | $X_1$ | $Y_1$ | $(X_1 - \bar{X})$ | $(X_1 - \bar{X})^2$ | $(Y_1 - \bar{Y})$ |
| Student 2 | $X_2$ | $Y_2$ | $(X_2 - \bar{X})$ | $(X_2 - \bar{X})^2$ | $(Y_2 - \bar{Y})$ |
| .<br>.<br>. | .<br>.<br>. | .<br>.<br>. | .<br>.<br>. | .<br>.<br>. | .<br>.<br>. |
| Student 272 | $X_{272}$ | $Y_{272}$ | $(X_{272} - \bar{X})$ | $(X_{272} - \bar{X})^2$ | $(Y_{272} - \bar{Y})$ |
| Sum ($\Sigma$) | $\Sigma(X_i)$ | $\Sigma(Y_i)$ | *0* | $\Sigma(X_i - \bar{X})^2$ | *0* |

*Table 3.7.3b: Sum of Squares and Residual Variance Matrix*

| Respondent($i$) | $(X_i - \bar{X})^2$ | $(Y_i - \bar{Y})^2$ | $(X_i - \bar{X})(Y_i - \bar{Y})$ | Predicted $(\hat{Y}_i)$ | Residual $(Y_i - \hat{Y}_i)$ | $(Y_i - \hat{Y}_i)^2$ |
|---|---|---|---|---|---|---|
| Student 1 | $(X_1 - \bar{X})^2$ | $(Y_1 - \bar{Y})^2$ | $(X_1 - \bar{X})(Y_1 - \bar{Y})$ | $(\hat{Y}_1)$ | $e_1$ | $e_{12}$ |
| Student 2 | $(X_2 - \bar{X})^2$ | $(Y_2 - \bar{Y})^2$ | $(X_2 - \bar{X})(Y_2 - \bar{Y})$ | $(\hat{Y}_2)$ | $e_2$ | $e_{22}$ |
| . . . | . . . | . . . | . . . | . . . | . . . | . . . |
| Student 272 | $(X_{272} - \bar{X})^2$ | $(Y_{272} - \bar{Y})^2$ | $(X_{272} - \bar{X})(Y_{272} - \bar{Y})$ | $(\hat{Y}_{272})$ | $e_{272}$ | $e_{2722}$ |
| Sum $(\Sigma i)$ | $\Sigma(X_i - \bar{X})^2$ | $\Sigma(Y_i - \bar{Y})^2$ | $\Sigma(X_i - \bar{X})(Y_i - \bar{Y})$ | $\Sigma(\hat{Y}_i)$ | *0* | $SS_{error}$ |

### 3.8 Limitations of the Study

Methodologically, the utilization of simple linear regression restricted the analysis to a single independent variable, which could result in neglecting other critical predictors of mathematics achievement such as class attendance and personal motivation.

Data collection relied entirely on self-reported questionnaires, subjecting the research to possible social desirability bias and minor inaccuracies in recalling daily time spent on digital platforms.

## CHAPTER FOUR

## DATA PRESENTATION AND ANALYSIS

This chapter presents the empirical findings generated from the field data collected from the sample of 272 undergraduate mathematics education students at the Faculty of Science and Education, Nagongera campus.

### 4.1 Demographic Data Presentation

*Table 4.1.1: Distribution of Respondents According to Year of Study*

| *Year of Study* | *Frequency* | *Percentage (%)* |
|---|---|---|
| *Year I* | 98 | 36.0% |
| *Year II* | 92 | 33.8% |
| *Year III* | 82 | 30.2% |
| *Total* | 272 | 100.0% |

*Source: Field Data (2026)*

*Table 4.1.1* displays the composition of the sample across the three undergraduate cohorts. Year I students comprised the largest segment at 36.0% (n = 98), followed closely by Year II at 33.8% (n = 92), and Year III students representing 30.2% (n = 82).

*Table 4.1.2: Primary Social Media Platforms Utilized for Academic and Non-Academic Purposes*

| ***SOCIAL MEDIA PLATFORM*** | ***GENERAL PLATFORM USAGE (TICK COUNT)*** | ***PRIMARY PLATFORM FOR ACADEMIC WORK*** | ***PRIMARY PLATFORM FOR NON-ACADEMIC WORK*** |
|---|---|---|---|
| ***WhatsApp*** | 268 (98.5%) | 134 (49.3%) | 114 (41.9%) |
| ***YouTube*** | 245 (90.1%) | 118 (43.4%) | 22 (8.1%) |
| ***TikTok*** | 154 (56.6%) | 2 (0.7%) | 84 (30.9%) |
| ***Facebook*** | 110 (40.4%) | 6 (2.2%) | 32 (11.8%) |
| ***Instagram / X*** | 95 (34.9%) | \| 10 (3.7%) | 18 (6.6%) |
| ***Total*** | | 272 (100%) | 272 (100%) |

*Source: Field Data (2026)*

As shown in *Table 4.1.2*, WhatsApp was the most universal application, used by 98.5% of respondents, and was selected by 49.3% as their primary academic tool (for peer groups and sharing materials) whereas YouTube was used by 90.1% of the sample, with 43.4% identifying it as their primary academic resource due to step-by-step video tutorials in course units like real analysis and calculus. Conversely, TikTok (30.9%) and WhatsApp (41.9%) dominated nonacademic, entertainment-centric intervals, highlighting the dual usage patterns noted in the literature.

**4.2 Inferential Statistical Analysis (Simple Linear Regression)**

To quantify the direct effect of daily social media usage duration (X, measured in hours) on mathematics achievement (Y, final percentage score), a simple linear regression analysis $Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$ was executed.

*Table 4.2.1: Model Summary*

| *Model* | *Pearson R* | *Coefficient of Determination ($R^2$)* | *Adjusted $R^2$* | *Std. Error of the Estimate $SE_{est}$* |
|---|---|---|---|---|
| *1* | *-0.5114* | 0.2616 | 0.2589 | 6.88% |

Statistical Term Definitions and Mathematical Estimators:

- **Pearson Correlation Coefficient (R= -0.5114):** it measures the linear association between X and Y,
- **Coefficient of Determination ($R^2$=0.2616):** it represents the proportion of the total variance in mathematics scores explained by daily screen time

  $R^2 = \frac{\text{SS}_{regression}}{SS_{total}} = \frac{\sum_{i=1}^{272}(\hat{Y}_i - \bar{Y})^2}{\sum_{i=1}^{272}(Y_i - \bar{Y})^2} = \frac{4530.12}{17310.20} = 0.2616,$

- **Adjusted R Square ($R^2_{adj}$=0.2589):** is the sample size-corrected coefficient of determination that adjusts for the degrees of freedom (Df) which prevents artificial inflation of model fit in the model:

$$R^2_{adj} = 1 - [\frac{(1 - R^2)(n-1)}{n-k-1}]$$

Where $n = 272(sample\ size)\ and\ k = 1(number\ of\ predictors)$

$$R^2_{adj} = 1 - \left[\frac{(1 - 0.2616)(272-1)}{272-1-1}\right] = 1 - \left[\frac{(0.7384)(271)}{270}\right] = 0.2589,$$

- **Standard Error of the Estimate (6.88%):** Measures the standard deviation of the residuals:

$$SE_{est} = \sqrt{\frac{SS_{residual}}{n-2}} = \sqrt{\frac{12780.08}{270}} = \sqrt{47.3336} = 6.88\%$$

Where SS represents the Sum of Squares.

The Model Summary (*Table 4.2.1*) shows a correlation coefficient (R) of -0.5114, indicating a moderate negative linear relationship. The coefficient of determination ($R^2$) is 0.2616, which proves that 26.16% of the total variance in mathematics achievement percentage scores among the students is directly accounted for by average daily social media usage duration whereas the remaining 73.84% of the variance is attributed to external variables outside the scope of this model (e.g., class attendance, background preparation). the standard error of the estimate (6.88%) indicates that on average, the students' actual mathematics scores deviate from the predicted regression model by approximately 6.88 percentage points.

*Table 4.2.2: Analysis of Variance (ANOVA)*

| ***Model*** | ***Sum of Squares (SS)*** | *Df* | *Mean Square* | *F* | *Sig. (p-value)* |
|---|---|---|---|---|---|
| *Regression* | *4530.12* | 1 | *4530.12* | *95.70* | *<.001* |
| *Residual (Error)* | *12780.08* | 270 | *47.33* | | |
| *Total* | 17310.20 | 271 | | | |

Statistical Term Definitions and Mathematical Estimators:

- Sum of Squares (SS):
  - $SS_{regression} = \sum_{i=1}^{272}(\hat{Y}_i - \bar{Y})^2 = 4530.12$:
    Explained variation due to social media usage duration,
  - $SS_{residual} = \sum_{i=1}^{272}(Y_i - \hat{Y}_i)^2 = 12780.08$:
    Unexplained variation due to unobserved factors,
  - $SS_{total} = \sum_{i=1}^{272}(Y_i - \bar{Y})^2 = 17310.20$:
    Total variance in the dependent variable (Y), i.e. between the observed value ($Y_i$) for individual i and the sample mean ($\bar{Y}$)

- Mean Square (MS): Variance calculated as MS = $\frac{SS}{Df}$:
  $MS_{regression} = \frac{4530.12}{1} = 4530.12$, $MS_{residual} = \frac{12780.08}{270} = 47.33$, where SS is Sum of Squares and Df is the degree of freedom

- **F-Statistic (95.70):** Test statistic evaluating whether the model explains variance significantly better than chance:
  $$F = \frac{MS_{regression}}{MS_{residual}} = \frac{4530.12}{47.33} = 95.70$$
  It is the ratio testing the overall statistical significance of the model against the null hypothesis $H_0: \beta_1 = 0$
  Because $p<.001$, the regression model is statistically significant.

The ANOVA results in *Table 4.2.2* confirm that the overall linear regression model is statistically significant, F(I,270) = 95.70, $p$<.001 which indicates that daily social media usage duration is a negative predictor of mathematics achievement among the undergraduate respondents.

*Table 4.2.3: Coefficients Table*

| *Parameter* | *Unstandardized β* | *Std. Error* | *Standardized Beta (β)* | *t-statistic* | *Sig. (p-value)* |
|---|---|---|---|---|---|
| $\beta_0$ *(Constant)* | 76.774 | *.932* | | *82.38* | .000 |
| $\beta_1$*(daily hours, X)* | -2.3725 | *.242* | -.511 | -9.78 | .000 |

Statistical Term Definitions and parameter Formulas:

- Unstandardized slope ($\beta_1$ = -2.3725): The estimated change in mathematics percentage points for every additional hour spent daily on social media:
  $\beta_1 = \frac{\sum_{i=1}^{n}(X_i - \bar{X})(Y_i - \bar{Y})}{\sum_{i=1}^{n}(X_i - \bar{X})^2} = -2.3725$,
- Unstandardized intercept ($\beta_0$=76.774): Baseline expected score when daily social media usage equals 0 hours: $\beta_0 = \bar{Y} - \beta_1 \bar{X} = 76.774$,
- *t*-statistic (*t*= - *9.78*): Evaluate $H_0 : \boldsymbol{\beta}_1 = 0$ via:

$$t = \frac{\beta_1}{SE(\beta_1)} = \frac{-2.3725}{0.242} = -9.78$$

The resulting empirical linear equation is:

$\hat{Y} = 76.774 - 2.3725X.$

- Standardized Beta ($\beta$*):
  Standardized regression coefficients remove unit scales by expressing variables in standard deviation units. It is computed as:

$$\beta^* = \beta_1 (\frac{S_X}{S_Y})$$

where $\beta_1$ = -2.3725 is the unstandardized coefficient, $S_X$ is the sample standard deviation of daily social media usage duration (hours), and $S_Y$ is the sample standard deviation of mathematics achievement. A value of $\beta^*$ = -0.511 indicates that for every 1 standard deviation increase in daily social media usage, mathematics performance decreases by 0.511 standard deviations.

As presented in *table 4.2.3* above, the unstandardized regression coefficient for daily social media usage is negative and statistically significant ($\beta_1$= -2.3725, $t$ = -9.78, $p$ <.001) confirms that for

each additional hour an undergraduate student dedicates to social media daily, their mathematics percentage score decreases by approximately 2.37 points. and the constant term ($\beta_0$ =76.774, $p$ <.001) represents the predicted baseline score for a student with zero social media hours.

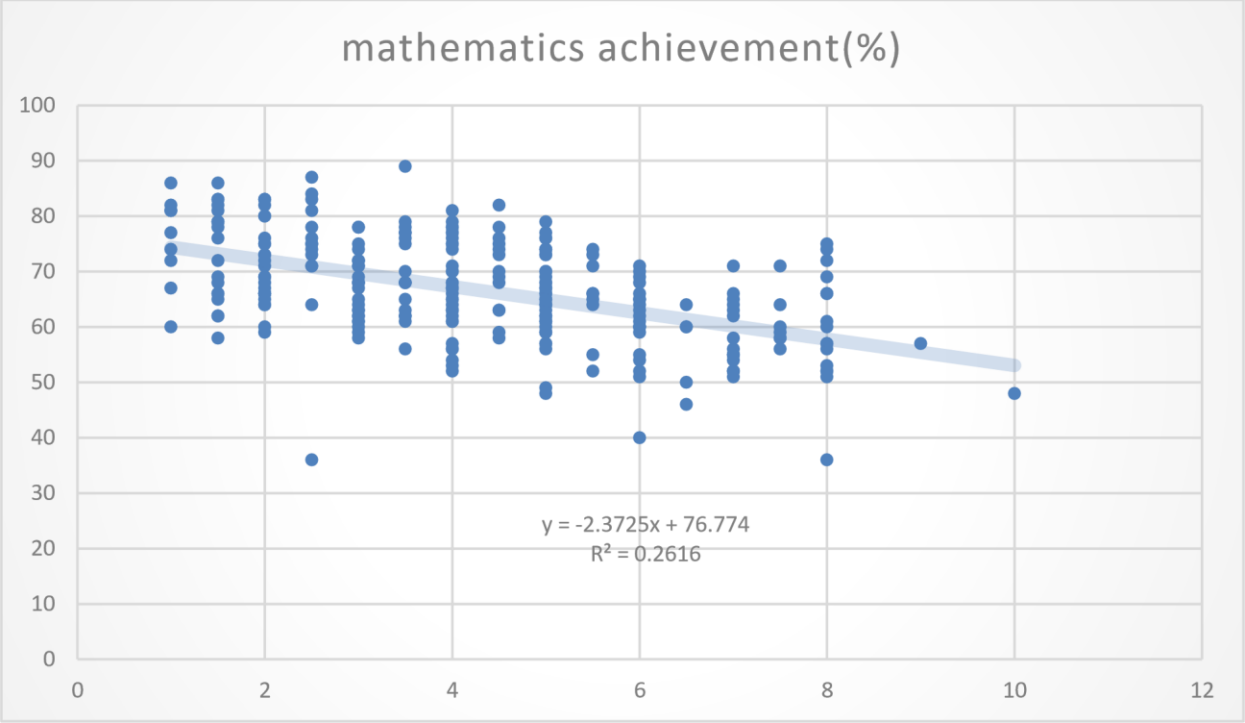



*Figure 4.2.4: Scatter plot showing the linear relationship between Daily social media usage (X) and Mathematics achievement(Y)*

As illustrated in the *figure 4.2.4* above, the scatter plot demonstrates a clear negative linear trajectory between average daily social media usage and mathematics percentage scores across the 272 respondents whereas the fitted trendline equation (Y= -2.3725X+76.774) confirms that higher daily screen duration is consistently associated with lower academic performance with the regression model explaining 26.16% of the total variance.

### 4.3 Hypothesis Testing and Final Decision

The study was guided by the following hypotheses at a 95% confidence level ($\alpha = 0.05$):

$H_0$: There is no significant relationship between daily social media usage and student test scores in mathematics.

$H_1$: There is a significant relationship between daily social media usage and student test scores in mathematics.

The linear regression analysis produced a test statistic of $F$ (1,270) = 95.70 with an associated $p$-value of $p$ <.001(sig. =.001) and the unstandardized regression coefficient for daily social media usage duration yielded a $t$-statistic of $t$ = -9.78($p$<.001) which exceeds the critical two tailed value of ± 1.96 at the 5% level of significance.

Since the calculated $p$- value ($p$ <.001) is strictly less than the chosen significance threshold (α = 0.05), the null hypothesis ($H_0$) is rejected and the alternative hypothesis ($H_1$) is accepted. Thus at 95% confidence level, average daily social media usage duration has a statistically significant negative influence on mathematics achievement among undergraduate students at Busitema University in Nagongera campus.

# CHAPTER FIVE

# SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

## 5.1 Summary of Findings

The empirical findings generated from the study provided vital insights into the digital habits of undergraduate mathematics education students at Busitema University and the subsequent consequences on their academic grades.

*Social Media Usage Patterns*: Descriptive analysis revealed that social media usage is universal among the students, with WhatsApp (98.5%) and YouTube (90.1%) emerging as the most widely used platforms.

*Academic vs. Non-Academic Trajectories:* The study confirmed a distinct dual-use trend. WhatsApp (49.3%) and YouTube (43.4%) served as primary academic channels where students accessed peer discussions and supplementary video tutorials for practice-heavy course units like real analysis and calculus. Conversely, platforms like TikTok (30.9%) and WhatsApp (41.9%) dominated recreational and entertainment-focused blocks.

*Regression Modeling and Predictive Influence*: Inferential statistical analysis confirmed that average daily social media duration is a statistically significant predictor of mathematics achievement ($F$ (1, 270) = 95.70, $p$ <.001). The coefficient of determination ($R^2$ = 0.2616) established that daily screen time accounts for 26.16% of the variance in final mathematics percentage grades. The resulting empirical equation (Y = 76.774 - 2.3725X) demonstrated that every extra hour a student spends daily on social media reduces their mathematics score by exactly 2.37 percentage points.

## 5.2 Conclusions

Based on the statistical analysis and hypothesis testing, the study rejected the null hypothesis ($H_0$), leading to several key conclusions:

First, while social media platforms offer substantial academic support as a "shadow curriculum" (particularly through visual-spatial problem-solving videos on YouTube), the net impact on final course grades remains significantly negative when usage time scales upward.

Second, the findings validate Time Displacement Theory within the localized context of Busitema University. Because mathematics is a hierarchically structured, highly demanding, and practice intensive discipline, it requires prolonged intervals of cognitive focus. The model proves that extensive daily screen time directly displaces the finite hours required for self-regulated practice, assignment execution, and targeted revision, leading to a quantifiable drop in final percentage grades.

Third, cognitive multitasking and the constant checking of digital notifications create divided attention during study hours. This fracturing of deep concentration actively compromises the quality of learning retention in higher-level mathematics.

### 5.3 Recommendations

To address the digital distractions affecting students while preserving the positive collaborative elements of social media, the study proposes the following targeted recommendations:

***For Students:***

Establish Self-Regulatory Frameworks: Students should actively track, monitor, and restrict their daily non-academic screen time using device management applications to prevent the displacement of active study windows.

Enforce Notification Blocks: During structured mathematics practice, self-regulated study sessions, and revision hours, students must silence all social media alerts to minimize cognitive distractions and fragmented attention.

***For Lecturers and Academic Staff:***

Direct Digital Curation: Rather than discouraging social media entirely, lecturers at the Faculty of Science and Education should guide students toward high-quality, step-by-step mathematical resources (such as specific YouTube tutorial channels) to supplement normal lecture hours.

Incorporate Structured Blended Learning: Faculty should institutionalize formal learning management systems (LMS) or designated collaborative spaces to keep academic discussions interactive without exposing students to the infinite scrolling features of recreational platforms.

***For the University Administration:***

Digital Wellness Sensitization: Busitema University should introduce academic counseling sessions and digital wellness workshops during orientation to build self-awareness among mathematics students regarding their digital habits and long-term academic goals.

## REFERENCES


Kaplan, A. M., & Haenlein, M. (2010). Users of the world, unite! The challenges and opportunities of Social Media. Business Horizons, 53(1), 59–68. https://doi.org/10.1016/j.bushor.2009.09.003

Kirschner, P. A., & Karpinski, A. C. (2010). Facebook® and academic performance. Computers in Human Behavior, 26(6), 1237–1245. https://doi.org/10.1016/j.chb.2010.03.024

Mulenga, E. M., & Marbán, J. M. (2020). Is COVID-19 the gateway for digital learning in mathematics education? Contemporary Educational Technology, 12(2), ep269. https://doi.org/10.30935/cedtech/7949

Obar, J. A., & Wildman, S. (2015). Social media definition and the governance challenge: An introduction to the special issue. Telecommunications Policy, 39(9), 745–750. https://doi.org/10.1016/j.telpol.2015.07.014

Selwyn, N. (2012). Social media in higher education. The Europa World of Learning, 1, 1–10.

Tall, D. (2008). The transition to formal thinking in mathematics. Mathematics Education Research Journal, 20(2), 5–24. https://doi.org/10.1007/BF03217474

Tess, P. A. (2013). The role of social media in higher education classes (real and virtual)–A literature review. Computers in Human Behavior, 29(5), A60–A68. https://doi.org/10.1016/j.chb.2012.12.032

Uganda Communications Commission. (2023). Market performance and industry trends report. Government of Uganda.

Badr, A., El-Zein, H., & Al-Hattab, M. (2024). Digital transformations in student networking: The impact of informal social media structures on collaborative STEM learning outcomes. Journal of Educational Technology Systems, 52(3), 211-229.

Galindo-Dominguez, R., Bezanilla, M. J., & Campo, L. (2024). Digital platforms as scaffolds for critical thinking and mathematical problem-solving in higher education. Computers & Education, 209, Article 104940.

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

Kapoor, K. K., Tamilmani, K., Rana, N. P., Patil, P., Dwivedi, Y. K., & Nerur, S. (2017). Advances in social media research: Past, present and future. Information Systems Frontiers, 20(3), 531-558.

Moghavvemi, S., Sulaiman, A., Jaafar, N. I., & Kasem, N. (2018). Social media as a complementary learning tool for university students: The case of YouTube. The International Journal of Management Education, 16(1), 37-42.

Ndaku, A. J. (2013). The digital distraction: Assessing the impact of mobile networks on secondary and tertiary students in East Africa (Unpublished master's thesis). Kenyatta University, Nairobi, Kenya.

Ochieng, O. P. (2023). Blended education systems at Busitema University: Navigating the shift from traditional classrooms to digital shadow curricula. East African Journal of Education Studies, 6(2), 89-104.

Oestreicher-Singer, G., & Zalmanson, L. (2013). Content or community? A digital business strategy for content providers in the social age. MIS Quarterly, 37(2), 591-614.

Osman, M. (2025). Entertainment-centric media consumption vs. e-learning optimization among undergraduate scholars. Journal of Higher Education Development, 17(1), 45-59.

Rahman, M. M., & Ashikullah, M. (2024). Cognitive multi-tasking and academic displacement: Quantifying the costs of social media use during structured study intervals. Behavior & Information Technology, 43(4), 712-727.

Tuhumwire, I. (2024). The utilization of digital networks for peer collaborative assignments among university students in Eastern Uganda (Research Report). Kampala: Makerere University Institutional Repository.

Zerrouk, F., Benali, M., & Bouchefra, M. (2026). Digital indulgence: Investigating the long-term impact of continuous scrolling applications on student memory retention indices. Education and Information Technologies, 31(2), 1421-1440.

## APPENDICES

## QUESTIONNAIRE FOR STUDENTS

INFORMED CONSENT STATEMENT

Dear respondent, you are invited to participate in a research study titled "Social media platforms and mathematics achievement among university students: a case study of Busitema University, Faculty of Science and Education." The objective of this study is to examine the relationship between daily social media usage duration and academic performance in mathematics. Your participation is entirely voluntary, and you may choose to withdraw at any point without any penalty or impact on your academic standing.

All responses provided in this questionnaire will be kept strictly confidential and used solely for academic research purposes. Your identity will remain completely anonymous, and no personal identifying information will be published or shared with third parties.

By completing and submitting this questionnaire, you indicate that you have read and understood the information above and voluntarily agree to participate in this study.

Thank you for your time and cooperation.

***SECTION A***

(Demographic and background data)

1.Gender

☐ Male

☐ Female

2.Year of study:

☐ Year I
☐ Year II

☐ Year III

3.Course: _____

4. Which platforms do you use? (Tick all that apply)

☐ WhatsApp
☐ Facebook

☐ YouTube
☐ TikTok
☐ Instagram

☐ Others: _____

5. What is your main purpose of using social media?

☐ Academics
☐ Entertainment
☐ Social interaction

6.What social media platform do you mostly use for academic purposes?

☐ WhatsApp
☐ Facebook
☐ YouTube
☐ TikTok
☐ Instagram
☐ Others:
_____

***SECTION B***

(Quantitative measurement of variables)

7. Please state your actual percentage score achieved in your most recent University Mathematics course unit
_____%

8. On average, how many hours per day do you actively spend using social media platforms (e.g., WhatsApp, TikTok, YouTube, Facebook, Instagram)?
_____ hours per day (please write specific numbers)