Investigating the Relationship Between Social Media Usage Duration and Academic Success Among Muslim Students Using Data Science Process

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Abstract— **This study explores the relationship between social media use and academic success among Muslim students. By analyzing social media usage patterns and potential correlations with academic performance, the research addresses key questions on how social media impacts this student group. A survey distributed to 222 Muslim students reveals a modest negative correlation between prolonged social media usage and academic performance, particularly for those spending over five hours daily on social media. The study concludes that social media can be a significant distraction, but its impact varies, highlighting the need for tailored strategies to mitigate potential negative effects on academic success.**

Keywords—social media, academic success, Muslim students, relationship, data science process, GPA, SDG.

I. INTRODUCTION

Social media has become an integral part of modern society, significantly impacting various aspects of individuals' lives. According to recent statistics, the global average time spent on social media platforms per day has reached 151 minutes [1]. Similarly, studies have found that undergraduate students spend an average of about three to four hours per day using social media platforms [2], indicating a substantial and pervasive presence in their daily routines. Concurrently, academic success, as measured by overall GPA, remains a fundamental indicator of students' achievements and capabilities in educational settings.

In alignment with Sustainable Development Goal 4.7—Education for Sustainable Development and Global Citizenship [33]—this study explores the intricate relationship between social media usage duration and the academic success of Muslim students. 'Social media usage duration' refers to the amount of time individuals spend engaging with various social media platforms, while 'academic success' pertains to the overall Grade Point Average (GPA) achieved by students and the time spent studying. By employing a data science process that encompasses systematic approaches to data collection, preprocessing, analysis, and interpretation [3], this investigation seeks to shed light on the potential influence of social media engagement on students' academic performance, with a focus on the Muslim student population.

Despite the extensive research on social media's impact on various demographics, a significant gap remains in understanding its specific effects on Muslim students' academic success. This study aims to fill that gap by providing insights into how social media usage influences the academic achievements of this understudied group.

II. PROBLEM STATEMENT

The pervasive influence of social media on the academic journey of Muslim students presents a complex and multifaceted challenge. As these students navigate the digital realm, understanding the intricate relationship between social media usage, time management, and academic success becomes paramount. Social media's influence on nearly every aspect of life underscores its potential impact on academic performance [4]. While social media can have a positive impact by connecting individuals and sharing information, it can also lead to behaviours that negatively affect students' academic performance [5]. Through analyzing survey data, we aim to identify specific patterns in social media use and share recommendations for effective time management strategies that maximize the positive potential of these platforms while mitigating negative impacts on academic performance.

III. PROJECT OBJECTIVE

- To determine whether a correlation exists between social media usage and academic performance among Muslim students.
- To identify the most popular social media platforms used by Muslim students, as well as their motivations for using them.
- To assess the presence and nature of social media policies within universities and institutions regarding student usage.

IV. RESEARCH QUESTIONS

1. What is the relationship between social media usage duration and academic success among Muslim students?

2. What are the most frequently used social media apps/platforms by Muslim students, and what purposes do they serve for these students?

3. Do institutions/universities have policies in place pertaining to social media usage at study places?

V. PROJECT SIGNIFICANCES

- Enhanced Awareness: The project will increase awareness among Muslim students.
- Bridging the knowledge gap: Little research exists specifically examining the social media habits and academic performance of Muslim students. This study helps address this gap, offering unique insights into this understudied segment.
- Informing educational practices: Understanding the impact of social media on Muslim students' academic performance can inform educators and institutions in developing strategies to support social media use in a balanced and productive manner.

VI. PROJECT SCOPE

A. *Scope:*

The population for this research project will focus on Muslim students who use social media platforms. This targeted population will consist of students from diverse backgrounds, ages, and educational levels who are actively using social media for various purposes, including communication, entertainment, and academic activities.

B. *Targeted User:*

This research targets 200 Muslim students from the population of social media users who identify as Muslims.

VII. PREVIOUS WORKS

A. *Social Media in the Current Situation*

The pervasive impact of social media, intensified by the COVID-19 pandemic, has driven extensive research into its effects across various areas. Studies show a significant positive link between social media use—academic, social, entertainment, and informational—and mental well-being among young adults [6]. Additionally, social media has been crucial for health promotion during the pandemic, aiding in the spread of health information and influencing preventive behaviours [7]. In healthcare, it has been used for community engagement, health promotion, patient education, and outreach [8]. However, the ethical implications of social media, including its effects on public opinion and societal manipulation, require careful regulation [9]. As research progresses, a nuanced understanding of social media's complex impact is essential for developing strategies to maximize its benefits while minimizing potential harms.

B. *Academic Success for Muslims*

Scholarly exploration into the academic success of Muslim individuals reveals diverse perspectives on the challenges and facilitators within this context. Academic performance and psychological distress of immigrant origin Muslim adolescents were studied, emphasizing the positive correlation between supportive teacher relations and academic achievement [10]. The impact of Islamophobia on post-secondary Muslim students was investigated, emphasizing the need for inclusive educational environments [11]. The importance of collaboration and knowledge exchange for academic success among Muslim academics in Malaysian institutions was highlighted [12]. A positive relationship between religiosity and academic achievement among Muslim students in Indonesia was found [13]. Examining leadership challenges, obstacles faced by Muslim women leaders in academia were addressed, calling for initiatives to promote gender equity [14]. Factors contributing to the success of Muslim-owned businesses were explored, emphasizing the role of innovation and proactive elements [15]. The psychological impact of the pandemic on students, including those from Muslim communities, was studied, emphasizing the need for support during crises [16]. In sum, understanding the multifaceted factors influencing the academic success of Muslim individuals is crucial for fostering inclusive and supportive educational environments.

C. *Data Science Process*

The data science process spans diverse topics such as risk management, visualization, and machine learning. Educational implications of data science were explored, emphasizing its role in developing innovative strategies [17]. The focus on risk management gaps in data science projects highlighted the need for deeper understanding [18]. Insights into the people and process of data science projects were provided [19]. Best practices to accelerate data science using Python were discussed [20]. The role of cloud-based processing in data science for visualization was investigated [21]. Innovative methods for biomedical data analysis were highlighted [22]. The impact of student motivation on science process skills was explored [23]. Visualization techniques were applied to Sichuan opera data [24]. In summary, the data science process encompasses risk management, visualization, and diverse applications, offering valuable insights across domains.

D. *Relationship Between Social Media Usage Duration and Academic Success*

Extensive research has explored the nuanced relationship between social media usage duration and academic success. Gender variations in this connection among university students were highlighted [23]. The moderating role of innovation characteristics of social media was delved into [24]. A significant relationship between the purpose of social media usage and academic performance, particularly for personal purposes, was found [25]. The moderating role of social media self-control failure was emphasized [26]. Investigation into teenage social media usage and academic success was stressed [27]. A survey on the relationship between social media usage and overall academic performance was conducted [28]. Excessive non-academic social media usage, especially in multitasking, could negatively impact academic performance [29]. The complex interplay of social media usage, multitasking, and students' academic self-efficacy was examined [30]. A significant relationship between time spent on social media and academic performance was revealed [31]. In conclusion, understanding the multifaceted relationship between social media usage duration and academic success requires consideration of gender, innovation, self-control, multitasking, and temporal aspects.
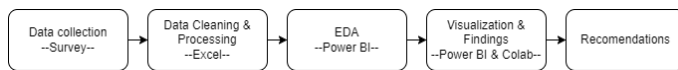
VIII. Methodology

Fig. 1. Data Science Process

This research project adopts a structured approach, guided by the data science process "Fig. 1", to methodically progress through key stages. The initial phase involves data collection, utilizing Google Forms to create customized surveys aligned with research objectives. Following the initial data collection, a thorough data refinement process is undertaken with Microsoft Excel. This includes addressing missing or inconsistent data, removing duplicates, and structuring the dataset for effective analysis. Subsequently, the third stage involves Exploratory Data Analysis (EDA), where statistical methods and visualizations are employed to uncover patterns and relationships within the dataset. This step lays the groundwork for further analysis. In the implementation phase, a combination of Microsoft PowerBI, Google Colab, and statistical calculations is utilized for a comprehensive analysis, extracting valuable insights from the refined dataset. The findings from this stage are then simplified and communicated through visualization, leveraging the visualization capabilities of Microsoft PowerBI. The conclusive stage incorporates the formulation of recommendations within the conclusion section, offering insights and suggestions for future actions based on the analysis conducted. Throughout the research project, the tools employed predominantly include Microsoft PowerBI, Excel and Google Colab for analysis, cleaning, and visualization, ensuring a comprehensive and rigorous approach to data processing. Google Forms facilitates efficient data collection aligned with research objectives. The recommendation stage seamlessly integrates into the conclusion, while other key stages are expounded upon in the results section, providing a clear and structured presentation of the research methodology.

IX. Result and discussion

A. Stage 1: Data Collection

The first step in the research project involved the collection of data through the utilization of an online service, specifically Google Forms. The form was published on October 20, 2023, and was accessible for responses until November 2, 2023. The target was to obtain 200 responses by the end of October 2023, and the form successfully received 222 responses. To maximize the reach of the survey, it was shared across various social media platforms, with a particular focus on WhatsApp, Instagram, and Facebook. Additionally, the survey was also disseminated within educational settings, specifically in classes. However, several challenges were encountered during the data collection process. Initially, the response rate was slow, and respondents expressed concerns about the length of the form. Furthermore, as the survey targeted Muslim students in universities across Arab countries, language comprehension issues were reported. Additionally, the requirement for respondents to provide their name and email posed a barrier, as some individuals were hesitant to disclose this information due to privacy concerns. Moreover, difficulties were encountered when attempting to share the survey on university pages, as administrative rejections were frequently encountered. To address these challenges, the decision was made to make the provision of name and email optional, a modification that was approved by the supervisor.

Survey Questions: The survey encompassed a series of questions designed to gather comprehensive insights into the social media usage patterns and academic experiences of the respondents. The questions included inquiries about demographic information such as age, country of origin, and current educational institution. Additionally, the survey delved into the respondents' social media habits, academic engagement, and perceptions regarding the impact of social media on their academic performance. Furthermore, the survey sought to ascertain the strategies employed by respondents to reduce social media usage and their awareness of institutional policies or guidelines related to social media usage within their educational institutions.

B. Stages 2 & 3: Data Processing and Cleaning

Upon the acquisition of 222 responses through the online survey, the subsequent phase of the research endeavour necessitated meticulous data processing and cleaning to ensure the integrity and reliability of the dataset. This critical phase involved addressing several challenges encountered during the data collection process, with a focus on the conversion of GPA scales, standardization of categorical responses, and simplification of multiple-choice questions.

The first challenge pertained to accommodating the diverse GPA scales utilized by respondents, particularly those from educational institutions in Egypt, where both 4.0 and 5.0 GPA scales are prevalent. To address this, the survey was structured into two distinct sections, each tailored to the specific GPA scale. Subsequently, the responses were consolidated, and a conversion process was undertaken to align the 5.0 GPA scale data with its approximate equivalents on the 4.0 scale. An alternative approach was also considered, involving the sole inquiry about GPA on a 4.0 scale, accompanied by the provision of a conversion formula for respondents utilizing the 5.0 scale, thereby streamlining the data processing and cleaning process. Furthermore, the standardization of categorical responses emerged as a significant endeavour, particularly in instances where varied spellings and formats were observed for categorical variables such as country, educational institution, and program. This necessitated meticulous efforts to ensure uniformity and consistency in the dataset. Notably, responses referring to the same educational institution were harmonized to eliminate inconsistencies, thereby enhancing the accuracy and reliability of the dataset. Additionally, personalized follow-up was conducted to address instances where respondents left certain categorical questions unanswered, ensuring comprehensive and complete data. Moreover, the simplification of multi-choice questions, such as those pertaining to the main purposes for using social media, was undertaken to facilitate streamlined analysis and interpretation. This involved the transformation of complex multi-choice responses into a format conducive to rigorous analysis, thereby enhancing the utility of the dataset for subsequent research endeavors. The execution of these data processing and cleaning tasks was

facilitated by the utilization of advanced data manipulation tools, including Excel, Power Pivot, and Power Query. These tools provided the necessary functionalities for seamless data transformation, standardization, and cleaning, ultimately contributing to the quality and reliability of the dataset for rigorous analysis.
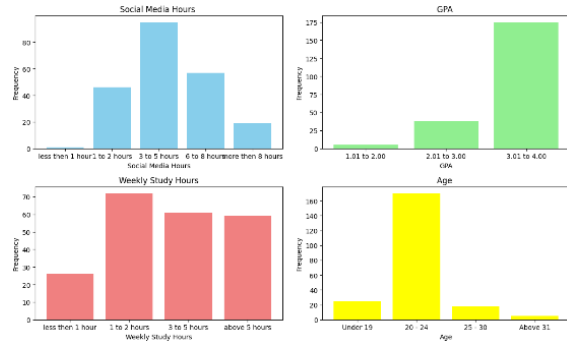
C. *Stage 4: EDA*

Fig. 2. Histogram Distribution

In this comprehensive exploration of the research methodology, PowerBI and Google Colab was leveraged to visually dissect the dataset, uncovering diverse insights. The dataset, consisting of 222 responses from 32 countries and 27 universities, disclosed a rich tapestry of academic backgrounds. Notably, 74.30% pursued bachelor's degrees, with the 20–24 age group spanning over 40 academic fields. Malaysia emerged as a focal point, housing 110 respondents, predominantly from the International Islamic University Malaysia (IIUM). "Fig. 2" Transitioning to the data-driven revelations, the study unveils a spectrum of social media engagement (mean of 4.54 hours) and academic excellence (GPA range: 1.5–3.5, mean: 3.2). Varied study habits (average weekly study hours: 3.57) and broad age distribution (15–50 years) further accentuate the study's complexity. Intriguing trends, such as a social media usage concentration of around 4 hours, consistently high GPAs, and a clustering of study hours at 1.5 per week, beckon deeper exploration. These findings fortify the groundwork for subsequent research stages, guiding nuanced interpretation and recognizing the profound implications of sample characteristics on the study's outcomes.
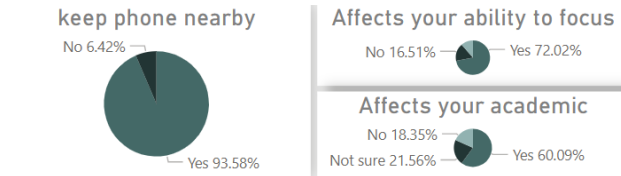
D. *Stage 5: Analysis & Findings*

Fig. 3. Effectiveness of Mobile Phone Usage on Academic Focus

In the analysis of the data collected, it is evident that the use of mobile phones and social media platforms among students has a significant impact on their academic performance and focus. The findings indicate that 93% of students keep their phones nearby while studying, with 70% acknowledging that it affects their ability to focus. Furthermore, 60% of students believe that the use of mobile

phones and social media platforms has a detrimental effect on their academic performance "Fig. 3". These statistics highlight the pervasive nature of mobile phone usage and its potential impact on students' academic endeavors.
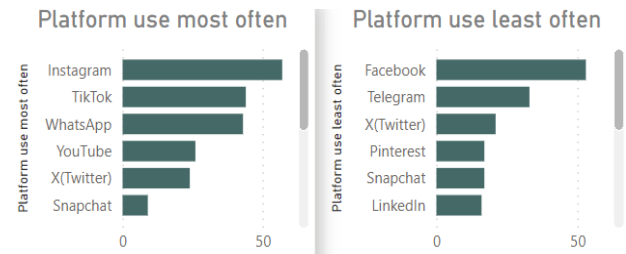

Fig. 4. Social Media Platforms Used by Students

In terms of social media platform usage "Fig. 4", the study reveals that Instagram is the most popular platform among students, followed by TikTok and WhatsApp, which collectively account for 66% of the usage compared to other platforms. Notably, almost every student has an account on WhatsApp, indicating its widespread adoption among the student population. Conversely, Facebook is the least used platform, 24% of students reporting Facebook as the least used platform. These findings shed light on the preferences and habits of students in relation to social media platforms and address the first part of the second research question: What are the most frequently used social media apps/platforms by Muslim students, and what purposes do they serve?

The purposes of using social media platforms among students were also examined, with the majority of respondents indicating that they use social media for purposes such as connecting with friends, staying updated with current news, and seeking entertainment. These purposes collectively represent more than 50% of the total responses, while only 13% of students reported using social media for educational purposes. This disparity underscores the predominance of social and recreational uses of social media among students, as opposed to its potential educational utility.
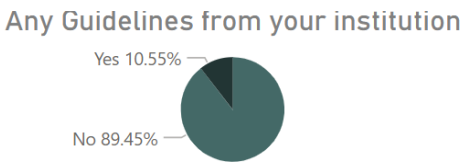

Fig. 5. Institutional Guidelines on Social Media Usage

Furthermore, "Fig. 5" the study investigated the existence of guidelines for social media usage within the university context. It was found that 90% of students reported the absence of specific guidelines for social media usage, indicating a lack of institutional regulation in this area. However, the remaining 10% mentioned a few guidelines that were in place, including promoting accountability and responsibility in social media use, preventing the spread of false information, restricting access to certain applications under university Wi-Fi, organizing programs to help students manage their social media time, and prohibiting the use of phones during class time. These guidelines reflect the efforts of some institutions to address the challenges associated with social media usage

among students. This answers the third data science question which is Do institutions/universities have policies in place pertaining to social media usage at study places?
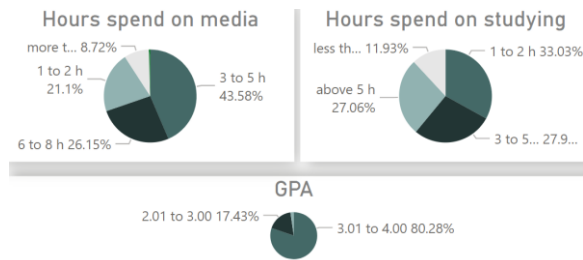

Fig. 6.   GPA & Hours Spent on Social Media and Studying

The initial analysis suggests a relationship between social media usage and academic success among Muslim students. Students who have difficulties focusing on their studies experience a negative impact on their academic performance. There is a positive correlation between students who keep their phones nearby and their ability to focus. Specifically, the category of students spending 3-5 hours studying increased from 26.96% to 42.84% among those who keep their phones nearby compared to those who do not. This suggests that students who keep their phones nearby spend less time studying, and the hours spent on studying is a significant factor in measuring the academic success of Muslim students. The proximity of the phone and social media usage are also related. The percentage of students who do not keep their phones nearby and use social media for more than 8 hours is 0%, while for those who keep their phones nearby, the percentage for the same category is 9.34%. This finding indicates that the duration of social media usage increases when the phone is kept nearby "Fig. 5 and 6".
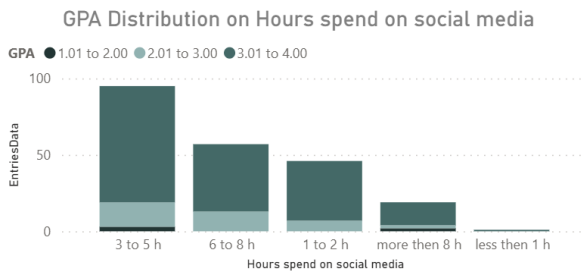

Fig. 7.   GPA Distribution

In examining the relationship between social media usage duration and academic success among Muslim students, the analysis reveals noteworthy insights. Specifically, the data indicates that there is a discernible association between social media usage duration and students' GPA. The percentage of students using social media for 1-5 hours and achieving a GPA of 3.01 – 4.00 is 81.56%. However, when the usage exceeds 5 hours, the percentage decreases to 77.62%. This observation suggests a modest relationship between social media usage duration and GPA for Muslim students "Fig. 7".

X.   FUTURE WORK

To further advance the research project, several key areas can be addressed to enhance the depth and scope of the investigation. Firstly, expanding the sample size by obtaining a larger number of responses from diverse demographics and geographical locations would significantly strengthen the statistical power and generalizability of the findings. This would enable a more comprehensive analysis of the relationship between social media usage duration and academic success among Muslim students, allowing for a more nuanced understanding of potential variations and trends within the data. Additionally, incorporating a broader range of factors to measure academic success beyond GPA and study period, such as student engagement, mental well-being, and extracurricular involvement, would provide a more holistic assessment of students' educational achievements and overall experiences. This multifaceted approach would offer a more comprehensive understanding of the complex interplay between social media usage and academic success, contributing to the development of targeted interventions and support mechanisms for students. Furthermore, future research could explore the longitudinal effects of social media engagement on academic outcomes, considering the dynamic nature of social media platforms and their evolving impact on students' educational journeys.

XI.   CONCLUSION

This study provides a comprehensive review and exploration of key areas, including the current state of social media usage, academic success among Muslim students, the data science process, and the relationship between social media usage duration and academic performance. Employing the data science process—from data collection and cleaning to exploratory data analysis and findings—the research revealed that drawing a definitive conclusion on the impact of social media usage on academic success is challenging. However, it is evident that students are aware of the potential influence of social media on their academic performance.

The final stage of the data science process includes simulations and recommendations, which are purposefully presented in this conclusion. Survey responses highlighted strategies such as setting time limits, disabling notifications, engaging in hobbies, and practising mindfulness as effective ways to manage social media usage. Some participants even suggested the complete removal of social media from their lives, aligning with Islamic teachings on time management, as emphasized in the Hadith: 'Man's feet will not move on the Day of Resurrection before he is asked about his life, how he spent it; his knowledge, how he used it; his wealth, how he earned and spent it; and his body, how he used it' [32]. Therefore, effective time management is crucial for Muslim students to maximize their free time.

In summary, this study sheds light on students' mobile phone and social media usage, exploring its prevalence and potential effects on focus and academic performance. While the results were inconclusive, it underscores the complexity of the issue and the need for further research into specific platforms and usage patterns. A deeper understanding of this relationship can help develop better support strategies for students and improve their academic outcomes.

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