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RESEARCH ARTICLE

Exploring the Impact of Google Education Tools on Student Engagement, Learning Motivation, and Academic Performance

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ABSTRACT

Education tools are indeed important for both students and teachers to facilitate effective teaching and learning processes. However, some students and teachers are not familiar with the education tools, and some are unhappy with the educational tools when changing face-to-face to online learning. The most visible impact will be student engagement, learning motivation, and academic performance. This research aims to analyze the relationship between the level used in each Google Educational Tool daily and academic performance, along with the mediating variables of student engagement and learning motivation. 103 scholars from Tunku Abdul Rahman University Management and Technologies are invited to participate in this study. A correlation test and mediation analysis were conducted to measure the significance relationship between the variables using IBM SPSS 23.0 and Process Marco v4.2. The results showed the pattern that the Google Education Tool positively impacts student engagement and learning motivation. The results of the mediation analysis show that student engagement and learning motivation mediates the positive relationship between Google Shared Docs and academic performance. Furthermore, learning motivation as a mediator is also positively related to Google Drive and academic performance. However, some mediators do not show a significant relationship between dependent and independent variables. This research is important in increasing the initiative of the student involved in the use of Google Education Tool and in achieving a higher level of engagement and learning motivation to achieve better academic performance.

INTRODUCTION

Academic performance is important for all students, as it is the key feature and one of the most important goals of education, which can be referred to students gaining knowledge, evaluated by their teachers through grading, and aimed at achieving specific academic goals set within a given timeframe (Nimmi Agarwal, 2021). The level of student engagement and learning motivation that students bring to their studies can significantly impact their success. This influence is profound as it can enhance or hinder their academic journey in various ways (Raza et al., 2020). Measurement of student engagement by participating students in their learning process is considered a reliable measure of academic success. It is more important than just the physical dimensions of the college library. In other words, how engaged students are in their studies can tell us a lot about their academic performance, often more than the mere resources available in the library. Therefore, students demonstrate engagement when they actively listen and pay close attention during classroom sessions and their daily assignments. Furthermore, learning motivation is a fundamental aspect that significantly influences a student's academic performance. It encompasses the student's inner drive and desire to enhance their learning experience and achieve academic excellence. On the contrary, lack of motivation can lead to disinterest in learning, procrastination, and poor academic performance. Therefore, fostering and nurturing student learning motivation is essential to promote their academic success and overall well-being.

During the covid-19 pandemic, the Malaysia government had applied that learning must be carried out online to reduce the risk of spreading the coronavirus (Batubara et al., 2021). E-learning offers numerous advantages for educational purposes. It serves as an efficient method for transferring knowledge, providing flexibility and accessibility for learners. Additionally, it serves as a platform for students to improve their understanding by accessing a wide range of online materials. By incorporating interactive learning activities, educators can further engage students and foster deeper comprehension. This not only enriches the learning experience, but also allows teachers to optimize their time spent on the teaching and learning process. The use of Google education tools has been explored in various educational settings. The implementation of an online learning management system utilizing the Google Classroom application to enhance students' capacity to create educational tools within a primary education program. Using this platform, we aimed to provide a dynamic and interactive learning environment that empowers students to develop their skills while facilitating seamless collaboration and resource sharing among educators and learners (Nafiah & Hartatik, 2020). In simple terms, these studies show how Google's education tools can make learning more fun and effective while also helping teachers and students adapt to changes in education. By using these tools, teachers can create engaging lessons and students can learn in new and exciting ways, making education more enjoyable and accessible for everyone (Salih, 2021).

The main objective is to make the learning process successful using Google Education tools and help the student to increase their engagement and learning motivation, which increases their academic performance. Therefore, the study aims to provide valuable information on the impact of Google education tools on student engagement and learning motivation. It seeks to examine how student engagement correlates with academic performance and how learning motivation influences academic achievement. By exploring these relationships, the research aims to shed light on the effectiveness of Google education tools in improving student performance and fostering a conducive learning environment. The main research question for this study is the following: How does the frequency of use of Google Education Tools correlate with academic performance? Are there differences in academic performance between students who use Google Education Tools regularly and those who do not? How do students' attitudes toward learning change after incorporating Google Education Tools into the classroom? What are the specific features of Google Education Tools that contribute the most to student engagement?

1.1 Problem Statement

The problem addressed in this study revolves around the gap or incongruity between the use of Google education tools and their actual impact on university students. This issue prompts an investigation of whether the current implementation of Google's education tools effectively enhances the learning experience, fosters student engagement, improves academic performance, or achieves other desired educational objectives. Identifying and addressing this disconnect is crucial for optimizing the use of technology in higher education and ensuring that students get the most from these digital resources. Due to the COVID-19 pandemic, most of the education sector has been forced to transition to online teaching methods.

As online teaching and learning are relatively new in Malaysia, the Malaysian government has introduced the majority of the education sector to use Google Education tools as a platform to facilitate the teaching and learning process (Batubara et al., 2021). The transition from face-to-face learning to online learning, or a flipped classroom under normal circumstances, the emergency transition to distance learning due to the crisis was a sudden and unplanned situation (Crompton et al., 2021). This unexpected and rapid transition to online learning has led to a multiplication of teacher strategies for distance learning in lectures, tutorials, project groups, lab work and assessments (Dietrich et al., 2020).

Many Malaysian and foreign researchers have considered these problems and ways to solve them were considered by many Malaysian and the foreign researchers who use online learning tools especially during the pandemic. Some of them concentrated on increasing the performance of higher education students during distance learning (Iglesias-Pradas et al., 2021). This is because higher education students are increasingly adept at utilizing Google's suite of educational tools. There are many guides and teacher training sessions devoted to the organization of online learning and the use of digital tools. Therefore, there was a decrease in teaching quality and an unwillingness of a significant proportion of teachers to work with continuously evolving technology, also (Andryukhina et al., 2020). The adequacy of educational resources for studying a discipline often varies, sometimes falling short if universities or instructors are unfamiliar with the area, or becoming overwhelming when students are tasked with navigating a vast array of materials from recognized educational platforms without proper guidance (Sastre-Merino et al., 2020). The decrease in the quality of a learning environment decreases student engagement which affects student motivation and lowers students' academic performance (Martin & Bolliger, 2018). Therefore, more research is needed on the effects of Google education tools on students' needs to be conducted to increase awareness among the education sector about these issues.

Contribution

Our study aims to contribute to existing literature by providing empirical evidence on the effects of integrating Google Education Tools into the classroom environment. By examining the influence of these tools on student engagement, learning motivation, and academic performance, we seek to fill a gap in research regarding the practical implications of technology-enhanced learning environments. Furthermore, our investigation will shed light on the specific features of Google Education Tools that are most beneficial to student outcomes, thereby informing educators and policy makers about effective strategies for integrating technology into teaching practices. Through rigorous analysis and interpretation of data, our objective is to provide actionable insights that can guide educational practitioners in the use of digital tools to enhance student learning experiences and ultimately improve academic achievement.

2.0 Literature Review

2.1. Google Classroom

Several studies have been conducted to explore the effectiveness and impact of Google Classroom in various educational settings. The study focused on pre-service student teachers in the Informatics

Engineering Education department and their perceptions of using Google Classroom in a blended course (Hidayat et al., 2019). The study investigated the effectiveness of Google Classroom among EFL students in Jordan, specifically looking at reading and writing performance (Albashtawi & Al Bataineh, 2020; Ting et al., 2024). Another study analyzed the effectiveness of English learning media through Google Classroom in higher education during the Covid-19 season (Syakur, 2020). There is a study that assessed the impact of Google Classroom as a platform for learning and collaboration at the teacher education level, highlighting the benefits of individual attention and group collaboration (Syakur, 2020). However, compared to a study that notifies that the Google Classroom does not affect student engagement, which will indirectly affect academic performance (Rawashdeh et al., 2021). According to the previous study, it examined the effectiveness of virtual classes with Google Classroom in teaching physics during the Covid-19 pandemic (Permata & Bhakti, 2020). Other work closely described the use of Google Classroom in authentic assessment at an elementary school in Jember, focusing on the implementation and constraints faced (Widiatsih et al., 2020). Another research studied the effectiveness of Google Classroom in teaching writing of recount text for senior high school students, showing significant improvement in students' writing performance (Laili & Muflihah, 2020). The research on the use of Google Classroom as an e-learning facility at Nahdlatul Ulama University in Yogyakarta, using the Innovation Diffusion Theory to understand its role (Dewi & Abadi, 2021). Based on the study that shows learning motivation can be improved through the Google Classroom during the pandemic (Daniati et al., 2020). According to a research, the result of the study notifies that Google Classroom does not affect learning motivation due to distance learning, which will indirectly affect the CGPA (Bondarenko et al., 2019). An experimental study on flipped learning and communicative competence was conducted using Google Classroom, where course materials were delivered online before class, focusing on communicative practices during in-person sessions (Makruf et al., 2021). These studies collectively contribute to the growing body of literature on the use and impact of Google Classroom in various educational contexts.

2.2. Google Shared Docs

The literature review on Google shared files focuses on various aspects related to the use of shared files in different environments and platforms. The study highlights the privacy and security issues that can arise when storing files in remote services, especially in IoT, Edge, and Cloud environments (Galletta et al., 2019). They evaluate Secret Share algorithms to identify their suitability for different environments. The research studies the factors that hinder shared file retrieval, testing the effect of collection size, file properties, and workload on file retrieval success and efficiency (de Assis Rodrigues et al., 2018). According to the previous study, it explores the use of Google's suite of cloud-based shared files to facilitate successful online student group collaboration (Huang et al., 2021). According to the previous study, the result demonstrated the positive effects with Google Docs for online collaborative writing, leading to enhanced student engagement (Li & Lai, 2022). They discuss the importance of social constructivist online peer-peer learning and present practical shared file case studies. A study shows that students increase motivation while using Google shared docs without prior experience and find it to be a positive and useful tool for their learning (Lee & Hassell, 2021). Other works propose a mechanism for enhancing proportional IO sharing on containerized Big Data file systems, focusing on maximizing IO utilization and accurately proportional IO sharing. Based on the previous study, the result means that Google's suite of cloud-based shared files is used to maintain quality online group work and promote social constructivist peer-peer learning (Stafford, 2021). The study proposes a share-ratio-based incentive mechanism for file sharing in P2P networks using the BitTorrent protocol (Adamu, 2021; Riouch et al., 2024). Based on the previous study, the result means that Google Docs can be used to facilitate online discussions and group work, fostering student-to-student interaction and engagement (Morse, 2021; Jam et al., 2014). However, other previous studies show that Google Drive has the risks of cheating and other challenges (Saleh Alharbi et al., 2021) Overall, the literature on Google shared files covers topics such as security and privacy concerns, factors that affect file retrieval, collaborative online group work, IO sharing mechanisms, incentive mechanisms for file sharing, and systems for enhancing security in cloud architectures.

These studies provide insight into the challenges and solutions related to the use of shared files in various contexts.

2.3. Google Drive

Cloud computing has become an essential part of web-based information technology, offering various services and resources to users. They conducted a study comparing cloud computing services provided by Microsoft OneDrive, Dropbox, and Google Drive to help users differentiate and understand the uses of each platform (Agus et al., 2019). From the previous study, the result shows that the implementation of digital portfolios through Google Drive can increase students' motivation (Cabrera-Solano, 2020). Google Drive, in particular, has been used in various applications, including learning-to-rank tasks in large-scale search and recommendation systems (Pasumarthi et al., 2019). . According to the previous study, the result shows that the use of Google Drive as a monitoring method leads to an increase of motivation (Moreno-Guerrero et al., 2020). Artificial intelligence tools have also found their way into library services, with applications like Google Assistant, Voice Searching, and Google Translate based on natural language processing (NLP) being used in libraries as highlighted by (Ali et al., 2020). According to the previous study, the result shows that the use of google drive as a monitoring method leads to an increase of motivation (Moreno-Guerrero et al., 2020). Furthermore, Google Drive has been integrated into educational processes, such as in Google Classroom, to facilitate smart learning and monitoring of students' knowledge in vocational schools (Гуревич et al., 2020). In the realm of recommendation systems, Google Drive has implemented a machine-learning system called Quick Access to predict which files a user may want to open, ultimately saving significant time for users (Chen et al., 2020). Furthermore, the acceptance and utilization of Google Drive in e-learning environments have been studied, with findings showing that students in selected private vocational-technical high schools in Indonesia accepted Google Drive services for e-learning purposes (Setiyani, 2021). In addition, Google Drive has been recognized as a valuable tool in language learning, with features such as assigning quizzes, providing additional study materials through videos, and integrating various applications such as Quizizz.

2.4. Google Chat

The use of Google Education Tools has been a topic of interest in the field of education, with various studies highlighting their impact on learning motivation. There are many tools that are useful in their learning process. The research conducted allows teachers to post lecture notes, create assignments, make announcements, set due dates for assignments, and teachers can create different groups in one classroom, then give each group a different assignment, thus making the class to be active and interesting (Hussaini et al., 2020). Additionally, a study found that the use of Google Drive increased pre-service students' motivation through more direct interaction between teachers and students (Moreno-Guerrero et al., 2020). Furthermore, the study focused on teaching with Google Classroom (Svensson et al., 2020). There is evidence that it can be challenging to ensure active participation in your work, as distance education can lead to lack of real contribution from students (Uspalenko et al., 2020). Based on previous research, the result shows that communication tools lead to an increase in motivation due to more direct communication between teachers and students (Moreno-Guerrero et al., 2020). These studies suggest that integrating Google tools into educational practices can have a positive impact on student engagement and learning outcomes. However, there is evidence that it can be challenging to ensure active engagement in their work, as distance education may lead to a lack of real contribution from students (Uspalenko et al., 2020). There is also evidence that there is a limitation for google chat that does not increase the learning motivation and CGPA (Widiyatmoko, 2021). Overall, the literature review indicates a growing interest in leveraging technology, specifically Google Education Tools, to enhance learning motivation and engagement in various educational settings and as an effective tool in improving teaching and learning. In addition, the implementation of gamification in education, including the use of technology, has been recognized as a strategy to increase student motivation and promote scientific thinking.

2.5 Student Engagement

Student engagement is a crucial factor that has been linked to various outcomes such as academic performance, retention rates, and motivation among students. This study explored the integration of high-touch strategies, such as E-Meetings, to improve student engagement, academic performance, and retention in large online courses (Gay & Betts, 2020). Similarly, this study also investigated the relationship between Internet Gaming Disorder (IGD) and student engagement, academic performance, and player-related characteristics, highlighting the importance of understanding these connections in a tertiary context (Samaha & Hawi, 2020). In the realm of gamification, they conducted a study on the use of badges to improve student engagement and academic performance (Dicheva et al., 2020). The results indicated that while badges positively impacted student engagement and academic performance, they did not affect intrinsic motivation. Furthermore, the research explored the use of multiple attempt quizzes to enhance student engagement among undergraduate nursing students (Hughes et al., 2020). Furthermore, McDonald et al. (2021) discussed the implementation of an online peer learning platform, RiPPLE, which positively impacted student engagement and academic performance. The study emphasized the influence of academic preparation on student engagement and the benefits derived from the platform. Furthermore, the study investigated the relationship between perceived classroom climate, student engagement, and academic performance among English-major teacher education students in China (Ma & Wei, 2022). According to previous studies, the result of student participation in online classes shows a positive correlation (Prasetyawati & Ardi, 2021). The study found that student participation partially mediated the relationship between perceived classroom climate and academic performance. Additionally, other work explored the impact of classroom environment, teacher competency, ICT resources, and university facilities on student engagement and academic performance (Hanaysha et al., 2023). Lastly, the research assessed student engagement levels in the online learning environment and examined the relationship between student engagement and academic performance using learning analytics tools (Sahni, 2023). According to previous studies, the results show a positive association between student participation and academic performance (Sahni, 2023). The findings suggested a positive association between student engagement and academic performance, advocating for the application of learning analytics to identify at-risk students and provide real-time feedback. According to the study, it focused on the impact of metaverse technology on student engagement and academic performance, highlighting the mediating role of learning motivation in improving academic performance through increased student participation (Al Yakin & Seraj, 2023).

2.6 Learning Motivation

Numerous studies have explored the connection between motivation and academic performance in diverse educational environments. Edgar et al. (2019) investigated how a student's initial motivation to enter an undergraduate health professions program related to their academic achievements in the first year, discovering a significant correlation between self-belief upon entry and academic performance. Similarly, Catingub (2020) examined how learning styles and the drive to learn influenced the academic performance of grade-five students, illustrating the interplay between these factors. Furthermore, Wu et al. (2020) explored how self-efficacy and engagement in learning mediated the relationship between motivation and academic performance among medical students, with the aim of a deeper understanding of motivation's impact in this field. Abdelrahman (2020) explored the effects of metacognitive awareness and academic motivation on students' academic achievements, uncovering a strong correlation between academic achievement and motivation. In the realm of medical education, Siqueira et al. (2020) focused on how metacognitive awareness and the drive to learn were associated among medical students, emphasizing the importance of self-regulated learning for academic and clinical success. From previous studies, the result shows that the student with learning engagement in how motivation affects academic performance is still unclear (Wu et al., 2020). Furthermore, Theobald (2021) conducted a meta-analysis on programs designed to improve self-regulated learning among university students, highlighting their positive effects on

academic performance and motivation. Abah et al. (2022) investigated how intrinsic motivation influenced junior secondary school students' academic performance in mathematics, revealing a significant positive relationship between intrinsic motivation and academic achievement. Lastly, Lyboldt et al. (2022) evaluated the effects of grading systems on the motivation, academic performance, and well-being of veterinary students, showing that satisfactory or unsatisfactory grading contributed to improved well-being and learning experiences without compromising motivation or academic performance.

2.7 Academic performance

Academic performance is about students reaching academic goals from progressing assignments, tests, and exams (Ward et al., 1996 as cited in Camacho-Morles et al., 2021). It can be checked from a person's Grade Point Average (GPA) and the amount of time that a student spends in learning in the University (Mandasari, 2020). Factors which affect the academic performance of a student are app usage, ability to recall, to know, to research, and self-convince (Abuhassna et al., 2020). According to Abuhassna et al. (2020), there is a positive relationship between academic performance and online education tools which Whitmer (2013) agrees with (Whitmer, 2013 as cited in Abuhassna et al., 2020). However, Barkand (2017) opposes this relationship and stated that the relationship between academic performance and online education tools is constant, as academic performance for online education tools requires experience to make use of both (Barkand, 2017 as cited in Abuhassna et al., 2020). Also, according to Abuhassna et al. (2020), Bloom theory is recommended to measure the relationship between academic performance and online education tools with four aspects, which is to recall, to know, to research, and to try (Abuhassna et al., 2020). Kim 2017 stated that spending more time using online education tools for coursework positively involves academic performance (Kim, 2017 as cited in Oguguo et al., 2021). Factors include continuous participation and good time planning. According to Oguguo et al. (2021), some tutors observe that students who follow those factors will have no trouble finishing their coursework (Oguguo et al., 2021). Additionally, according to Oguguo et al. (2021), online education tools and functions of the tools can help students improve their academic performance online. Functions include online communication, accessibility to materials for a specific course, and fast feedback return (Ebardo and Valderama, 2009 as cited in Oguguo et al., 2021). Ali et al. (2020) conducted research and showed that student confidence affects student engagement and self-awareness, which results in affecting academic performance (Ali et al., 2020). Ali et al. (2020) also stated that a student's place of study reveals many different moods from students (Ali et al., 2020). Pekrun (2006) stated that students with a good mood are one of the factors that affect academic performance, which Chin et al. (2017) agree with (Pekrun, 2006, Chin et al., 2017 as cited in Ali et al., 2020). Pekrun et al. (2009) stated that a student's good mood affects their exam grades (Pekrun et al., 2009 as cited in Ali et al., 2020). Good mood includes enjoyment, hope, and pride (Pekrun et al., 2009 as cited in Ali et al., 2020).

Table 1: Covariates of relationships in previous studies

Education Tools	Study Focus	Main Findings	Resources
Google Classroom	Perceptions of preservice student teachers; Effectiveness among EFL students; Impact on English learning media; Use in teacher education; Virtual classes in Physics	Positive perceptions; Positive impact on performance; Effective for collaboration; Varied effectiveness observed	Hidayat et al. (2019). Albashtawi & Al Bataineh (2020).
Google Shared Docs	Privacy and security issues; Factors affecting file retrieval; Facilitating online group collaboration; Enhancing collaborative writing	Security concerns; Factors affecting retrieval; Positive impact on collaboration and engagement; Risks and challenges	Galletta et al. (2019). de Assis Rodrigues et al. (2018).

Google Drive	Comparison with other cloud services; Impact on motivation; Integration in educational processes; Use in language learning	Differentiation from other services; Positive impact on motivation; Integration in education; Use in language learning	Agus et al. (2019). Cabrera-Solano (2020).
Google Chat	Integration in teaching practices; Impact on motivation; Challenges in distance education; Direct communication; Limitations	Active learning integration; Positive impact on motivation; Challenges in distance learning; Direct communication	Moreno-Guerrero et al., (2020). Svensson et al. (2020).
Student Engagement	Integration of high-touch strategies; Relationship with Internet Gaming Disorder; Use of badges and quizzes; Impact of online peer learning platform	Positive impact on performance; Influence of academic preparedness; Mediating role in classroom climate and performance	Gay & Betts (2020). Samaha & Hawi, (2020).
Learning Motivation	Influence on academic performance; Relationship with self-belief, learning styles, self-efficacy, and engagement; Effects on intrinsic motivation	Positive correlation with academic achievement; Influence of various factors on motivation and performance	Edgar et al. (2019). Catingub (2020).
Academic Performance	Factors affecting performance; Relationship with online education tools and motivation; Effects of mood on performance	Positive relationship with online tools and motivation; Impact of mood on exam grades	Abuhassna et al. (2020).

Table 1 provides a concise overview of the literature review conducted on various aspects related to Google Education Tools, student engagement, learning motivation, and academic performance. Each section of the literature review is summarized, highlighting key findings, research methodologies, and important insights derived from the studies. Based on the literature review, the following hypotheses are derived.

H1: There is a relationship between student engagement and academic performance.

H2: There is a relationship between learning motivation and academic performance.

H3: There is a relationship between the Google Classroom and student engagement.

H4: There is the mediating effect of student engagement in the relationship between Google Classroom and academic performance.

H5: There is a relationship between Google Classroom and learning motivation.

H6: There is a mediating effect of learning motivation in the relationship between Google classroom and academic performance.

H7: There is a relationship between the Google Share document and student performance.

H8: There is the mediating effect of student engagement in the relationship between Google share documents and academic performance.

H9: There is a relationship between google share documents and learning motivation.

H10: There is the mediating effect of learning motivation in the relationship between google share documents and academic performance.

H11: There is a relationship between Google Drive and student performance.

H12: There is the mediating effect of student participation in the relationship between Google drive and academic performance.

H13: There is a relationship between Google drive and learning motivation.

H14: There is a mediating effect of learning motivation in the relationship between Google drive and academic performance.

H15: There is a relationship between Google chat and student performance.

H16: There is the mediating effect of student engagement in the relationship between Google chat and academic performance.

H17: There is a relationship between google chat and learning motivation.

H18: There is the mediating effect of learning motivation in the relationship between google chat and academic performance.

3.0 RESEARCH METHODOLOGY

The questionnaire was used to collect data related to the use of google education tools on student engagement, learning motivation, and academic achievement. The questionnaire is designed and structured using Google Forms with the details of the items recorded in Table 2. The questionnaire was distributed to all undergraduate students from Faculty of Computing and Information Technology (FOCS) on Bachelor's degree year 1, 2 and 3 of Tunku Abdul Rahman University of Management and Technology (TAR UMT Kuala Lumpur Campus) on 14 March 2024 and data was collected from respondents after three weeks. The sampling method used in this survey is purposive sampling. The questionnaire was distributed through social media such as WhatsApp, Instagram, Xiaohongshu, and emails. To ensure that recipients are TAR UMT students, the google form is privately sent to the inbox of Instagram and Xiaohongshu users. Table 1 shows the questionnaire item that was used to obtain the data.

Table 2: Questionnaire items

Category	Questionnaire Items	Resources
Demographic	Q1. Gender Q2. Age Q3. What is your current study year	-
Student Engagement	Q1.How many hours do you spend on the following platform everyday? Q2.I always discuss materials to my friends using the following platform. Q3.I always contact my lecturer whenever I get difficulty in understanding the material Q4.I can access the following platform from both personal computer and mobile computer Q5.Sometimes, I can not access the following platform for no reason. So, I texted my lecturer asking for extended time for assignment submission Q6.The following platform can be accessed anytime and anywhere. Q7.Financial issues does not matter during online learning using following platform Q8.Online learning enables me to learn autonomously using the following platform.	Mandasari (2020)
Learning Motivation	Q1.I enjoy learning through the following platform Q2.Materials presented on the following platform enables me to understand easily.	Mandasari (2020)

	Q3. I can get more sources for learning through the following platform that can support the learning process Q4.I always take part in discussion form through the following platform Q5.I enjoy the challenges when using the following platform in learning a subject/course. Q6.I want to pass the subject. So, I study seriously for this course through the following platform	
Academic Performance	Q1.What is your current CGPA?	-

3.1 Data Analysis

This study analyzes data using IBM SPSS for data transformation and Pearson correlation, the Process Macro v4.2 by Andrew F. Hayes for mediation analysis. First, we will select the main dependent variable that we want to focus on. Next, we will select the independent variable that we assumed, and thought will affect the dependent variable. IBM SPSS will generate a table to clearly show the statistical significance of the variable, and we will select the variables that have a significant value of less than 0.05. For the mediator variable, we use mediation analyses that use the indirect effect among the variables. Then we calculate the descriptive statistics and the correlation between the variables.

4.0 RESULTS

4.1 Demographics

A total of 103 undergraduate students participated in this study with their demographic data, as shown in Table 2. There are a total of 53.4% of male undergraduates and 46.6% of female undergraduates. Moreover, more than most respondents, which is 86.3%, are 19 -22 years of age. 75.6% of the current CGPA score is 3.41- 4.0 and 45.6% of the students are in year 2 of bachelor's degree.

Table 3: Demographic information of the participants

Characteristics	Frequency (n)	Percentage (%)
Gender		
Male	55	53.4
Female	48	46.6
Age		
19	3	2.9
20	10	9.7
21	44	42.7
22	32	31.1
23	5	4.9
24	5	4.9
25	1	1.0
26	1	1.0
27	1	1.0
28	1	1.0
Study Year		
1	20	19.4
2	47	45.6
3	24	23.3
4	12	19.4
CGPA		
< 3.0	1	1.0

3.0 -3.2	16	15.5
3.21 - 3.4	8	7.8
3.41 - 3.6	26	25.2
3.61 - 3.8	19	18.4
3.81 - 4.0	33	32.0
Total	**103**	**100**

4.2 Pearson correlation analysis

Table 3 shows the descriptive statistics and the correlations between the variables. Based on the result in Table 2, the first discovery is the significant relationship between student engagement and academic performance (r = 0.209, Sig < 0.05). Therefore, student engagements bring impacts to the academic performance. Since the correlation is positive, this also reveals that greater student engagement increases academic performance. H1 is true and acceptable. The results also show a significant positive correlation at the level of 0.001 between the google classroom and student participation (r = 0.45, Sig. (2-tailed) < 0.001). An increase in using google classrooms was significantly correlated at the 0.05 level with learning motivation (r = 0.289, Sig. (2-tailed) < 0.05). Hence, H3 and H5 are accepted. Furthermore, the results show a positive relationship between Google shared docs and student engagement (r = 0.527, Sig.(2-tailed) < 0.001), as well as the relationship between the google shared documents and the learning motivation (r = 0.37, Sig (2-tailed) < 0.001). Therefore, H7 and H9 are accepted. On the other hand, the relationship between Google Drive and student engagement is positively correlated, since the higher the use of google drive affects student engagement (r = 0.479, Sig.(2-tailed) < 0.001), and the level of 0.001 between the google drive and learning motivation (r = 0.371, Sig.(2-tailed) < 0.001). Therefore, H11 and H13 are supported. The results show that the relationship between Google Chat and learning motivation is positively significant (r = 0.383, Sig.(2-tailed) < 0.001). Additionally, the results also show that the relationship between Google chat and learning motivation is also positively significant (r = 0.243, Sig.(2-tailed) <0.001). Therefore, H15 and H17 are true and accepted. The correlation coefficient (r) between learning motivation and academic performance was found to be 0.134. However, it is important to note that this correlation was not statistically significant (p > 0.05). Therefore, the relationship between learning motivation and academic performance in our study did not reach statistical significance. Although a positive correlation observed, it was not strong enough to conclude that there is a meaningful relationship between these variables in our sample. Therefore, H2 is rejected.

Table 3: Pearson correlation analysis

Variable	M	SD	SE	LM	AP
GC	2.0	0.74	0.45***	0.289*	-
GSD	3.0	0.705	0.527***	0.37***	-
GD	2.0	0.7325	0.479***	0.371***	-
GCH	1.0	0.82	0.383***	0.243***	-
SE	3.86	0.64	-	-	0.209*
LM	4.0	0.72	-	-	0.134
AP	3.61	0.35	0.209*	0.134	-

Notes: GC = Google Classroom, GSD = Google Shared Docs, GD = Google Drive, GCH = Google Chat, SE = Student Engagement, LM = Learning Motivation, AP = Academic Performance. *sig<0.05; **sig<0.01; ***sig<0.001.

4.3 Mediation Analysis

Meanwhile, Table 4 disclosed that the CGPA partially mediates the relationship between student participation in the use of Google Classroom with an indirect effect of 0.0183 and a 95% confidence interval value of [-0.0152, 0.0503]. Therefore, H4 is not true and rejected as the significant level is less than 0.05. Learning Motivation partially mediates the relationship between the use of Google classrooms with an indirect effect of 0.0116 and a 95% confidence interval value of [-0.065, 0.0323].

This indicates that H6 is not true and is rejected as the significance level is less than 0.05. Student engagement was found to partially mediate the relationship between the use of Google shared docs and the CGPA with an indirect effect of 0.0163 and a 95% confidence interval value of [-0.0270,0.0535]. This indicates that H8 is true and acceptable. The study results also revealed that the learning motivation partially mediates the relationship between Google shared docs and CGPA with an indirect effect of 0.0114 and a 95% confidence interval value of [-0.0123,0.0347]. This indicates that H10 is true and acceptable. The result in Table 4 also shows that student engagement partially mediates the relationship between the use of Google Drive and CGPA with an indirect effect of 0.0144 and a 95% confidence interval value of [-0.0232, 0.0506]. This indicates that H12 is not true and rejected. The reason is that the relationship is not significant, which indicates that p is not less than 0.05. On the other hand, learning motivation mediates the indirect effect of 0.0056 and a 95% confidence interval value of [-0.0211,0.0290]. This indicates that H14 is true and acceptable. The result is Table 4 also shows that student participation partially mediates the relationship between Google chat and CGPA with an indirect effect of 0.0149 with a 95% confidence interval value of [-0.0148, 0.0457]. This indicates that H16 is not true and rejected as the significant level is less than 0.05. Lastly, learning motivation partially mediates the relationship between the use of Google chat and CGPA with an indirect effect of -0.0034 and a 95% confidence interval value of [-0.0311, 0.0194]. This indicates that the H18 is not true and rejected as the level of significance is less than 0.05.

Table 4: Direct and Indirect Effects with Bootstrap 95% Confidence Interval for Mediation Analysis

Predictor	Mediator	Dependent Variable	Direct Effect	Indirect Effect (95% CI)
GC	SE	CGPA	0.0365	0.0183(-0.0152, 0.0503)
GC	LM	CGPA	0.0432	0.0116(-0.065, 0.0323)
GSD	SE	CGPA	0.0923*	0.0163(-0.0270,0.0535)
GSD	LM	CGPA	0.0971*	0.0114(-0.0123,0.0347)
GD	SE	CGPA	0.0589	0.0144(-0.0232,0.0506)
GD	LM	CGPA	0.0676*	0.0056(-0.0211,0.0290)
GCH	SE	CGPA	0.0143	0.0149(-0.0148,0.0457)
GCH	LM	CGPA	0.0326	-0.0034(-0.0311,0.0194)

Notes: GC = Google Classroom, GSD = Google Shared Docs, GD = Google Drive, GCH = Google Chat, SE = Student Engagement, LM = Learning Motivation, *sig<0.05; **sig<0.01; ***sig<0.001

5.0 DISCUSSION

Based on the H1 result, it was emphasized that there is a positive correlation between student engagement and academic performance. Therefore, H1 is supported. This leads us to believe that the importance of student participation is crucial in enhancing academic performance. According to previous studies, the results show a positive association between student engagement and academic performance (Sahni, 2023). The H2 result shows that learning motivation is positively correlated between learning motivation and academic performance, but it is not significant. This means that learning motivation does not affect the accuracy of academic performance. From previous studies, the result shows that the student with learning engagement in how motivation affects academic performance is still unclear (Wu et al., 2020). Consistent with the result provided, it emphasized that there is a positive correlation between the hours spent in Google classroom and student engagement. Therefore, H3 is supported. This leads us to believe that the importance of using Google Classroom is crucial in enhancing student engagement. According to the previous studies, the result of student engagement through online classes shows a positive correlation (Prasetyawati & Ardi, 2021). The result of H4 shows that the relationship mediated by student engagement between the google classroom and academic performance was positively correlated, as it has a positive indirect effect, but it is not significant. Student engagement plays an intermediary role in the relationship between the Google classroom and academic performance, which shows that students with spending more

time on google classroom are bound to have higher engagement which will indirectly increase their CGPA. However, compared to a study that notifies that the Google Classroom does not affect student engagement, which will indirectly affect academic performance (Rawashdeh et al., 2021). The H5 result shows that the Google Classroom is positively correlating with learning motivation. Therefore, H5 is supported. This means that Google Classroom is important in enhancing the learning motivation. Based on the study that shows learning motivation can be improved through Google Classroom during the pandemic (Daniati et al., 2020).

The H6 result shows that the learning motivation-mediated relationship between Google Classroom and academic performance was positively correlated, as it has a positive indirect effect, but it is not significant. Learning motivation plays an important role in the relationship between the Google classroom and academic performance, which means that spending more time on google classroom is bound to have a higher impact on learning motivation, which will indirectly increase their CGPA. According to research, the result of the study notifies that Google Classroom does not affect learning motivation due to distance learning, which will indirectly affect the CGPA (Bondarenko et al., 2019). The H7 result shows that the Google-shared document is positively correlated with student engagement. Hence, H7 is supported. This means that Google-shared docs are crucial in enhancing the student engagement. According to the previous study, the result demonstrated the positive effects with Google Docs for online collaborative writing, leading to enhanced student engagement (Li & Lai, 2022). The H8 results show that the student engagement mediates in the relationship between the Google shared docs and academic performance was positively correlated as the indirect effect is positive. It shows that the time spent on Google shared docs may have better academic performance when they use google shared docs during their learning process. Based on the previous study, the result means that Google's cloud-based shared files suite can maintain quality online group work and promote social constructivist peer-peer learning (Stafford, 2021). The H9 result shows that the Google shared docs are positively correlated with learning motivation. H9 is accepted. This shows that the Google-shared docs are deciding on enhancing the learning motivation. There is evidence that Google Docs have a perceived impact on learning motivation (Hasan et al., 2020). The H10 result shows that the learning motivation mediated the relationship between the google shared documents and academic performance was positively correlated as the indirect effect is positive. This shows that learning motivation plays a crucial role in the relationship between Google-shared documents and academic performance. A study shows that students increase motivation while using Google shared docs without prior experience and find it to be a positive and useful tool for their learning (Lee & Hassell, 2021). The H11 result shows that Google Drive is positively correlating with student engagement. H11 is supported. This shows that Google Drive plays an important role in enhancing student engagement. Based on the previous study, the result means that Google Docs can be used to facilitate online discussions and group work, fostering student-to-student interaction and engagement (Morse, 2021).

Based on that result, H12 shows the student participation mediates the relationship between Google drive and academic performance was positively correlated, as it has a positive indirect effect, but it is not significant. Student engagement plays an important role in the relationship between Google Drive and academic performance, which shows that students who use Google Drive frequently are bound to have higher engagement, which will indirectly increase their CGPA. However, other previous study shows that Google Drive has the risks of cheating and other challenges (Saleh Alharbi et al., 2021). It means that Google Drive does not really affect the student participation, which will indirectly affect the CGPA. The H13 result shows that the Google drive positively correlating with learning motivation. H13 is supported. This shows that Google Drive plays an important role in improving learning motivation. According to the previous study, the result shows that the use of Google Drive as a monitoring method leads to an increase of motivation (Moreno-Guerrero et al., 2020). The H14 result shows that learning motivation mediates the relationship between Google drive and academic performance, which was positively correlated as the indirect effect is positive. It shows that students who have better learning motivation when using Google Drive in their learning

process are bound to have a higher CGPA. From the previous study, the result shows that the implementation of digital portfolios through Google Drive can increase students' motivation (Cabrera-Solano, 2020). The H15 result shows that Google chat is positively correlated with student engagement. H15 is accepted. This shows that Google chat plays an important role in enhancing student engagement. There is evidence that Google chat to ensure active student participation in remote teaching, utilizing educational technologies to facilitate interaction (Ahshan, 2021). The H16 results show that student engagement mediates the relationship between Google chat and academic performance was positively correlated, as the indirect effect is positive. This means that the student who has better student engagement may use Google chat frequently will indirectly increasing their CGPA. There is evidence that it can be challenging to ensure active participation in your work, as distance education can lead to lack of real contribution from students (Uspalenko et al., 2020). The H17 results show that the Google chat is positively correlating with learning motivation. H17 is true and acceptable. This shows that the google chat plays an important role in improving learning motivation. Based on previous research, the result shows that communication tools lead to an increase in motivation due to more direct communication between teachers and students (Moreno-Guerrero et al., 2020). Lastly, that H18 shows the learning motivation mediates the relationship between google chat and academic performance was negatively correlated as the indirect effect is negative. It shows that students may have a better CGPA even if they have a low level of time spent on Google chat. There is evidence that there is a limitation for google chat that does not increase the learning motivation and CGPA (Widiyatmoko, 2021).

6.0 CONCLUSION

Based on the results of the analysis, it can be concluded that Google education tools can affect the student engagement and learning motivation, which brings huge effect on academic performance. However, this research also has some limitations. For example, limited generalizability. The findings from a specific study may be unable to be applicable to all educational contexts due to the variety of student populations, teaching methods, and institutional settings. Also, measurement issues. Measurement of student engagement and learning motivation can be complex and may not capture the full range of student learning outcomes. After that, there are the temporal factors. The research is conducted during a specified time, which may be easily influenced by external factors or technological advancements. This potentially limits the relevance of findings over time. There are disparities in digital use. Disparities in access to technology and Internet connectivity among students may impact their ability to use Google Education Tools, potentially affecting the research findings. Moreover, the user experience on using Google educational tools. The variability in students' experiences with Google Education Tools, such as familiarity with the platform and technical difficulties, can influence their engagement and motivation, which complicates the interpretation of the results.

From the above research, more effective methods can be used to improve academic performance. For example, the education sector needs to leverage on-line resources and educational technologies which can provide the students with access to a wealth of information and learning opportunities beyond the traditional classroom. Platforms like Google Classroom and Google Shared Docs enables educators to deliver personalized instruction, share supplemental materials and facilitate asynchronous learning catering to diverse learning styles and preferences. Universities should encourage students to collaborate and group work through platforms such as Google Shared Docs and Google Drive that can improve student academic performance. It allows students to exchange ideas, share knowledge, and create content together. This fosters critical thinking skills and deeper engagement with course material.

Regarding specific digital tools, Google Classroom emerges as a platform that positively influences student engagement and learning motivation, potentially impacting academic performance. The use of Google Shared Docs and Google Drive also shows positive correlations with student engagement, learning motivation, and academic performance. However, it is important to note the nuances, such

as the potential risks associated with cheating and challenges in engagement. Google Chat appears to play a vital role in improving student engagement and learning motivation, which can indirectly affect academic performance. However, there are conflicting findings regarding its impact on academic performance, indicating the need for further research on its efficacy as an educational tool.

In general, while digital tools such as Google Classroom show promise in improving student engagement, learning motivation, and potentially academic performance, their effectiveness can vary based on factors such as implementation strategies, student preferences, and contextual factors. Future research should go deeper into these nuances to provide more comprehensive information on the role of digital tools in education. Furthermore, educators should consider thoughtfully integrating these tools into their teaching practices, ensuring that they align with pedagogical goals and foster meaningful learning experiences for students.

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