

Students' Perceptions of Google Sites in Quantitative Learning: A Technology Acceptance Model (TAM) Based Evaluation of Platform Adoption

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ABSTRACT

This study investigates students' acceptance of Google Sites (GS) as a digital learning platform for Mathematics and Statistics courses, guided by the Technology Acceptance Model (TAM). A total of 251 diploma and degree students from Universiti Teknologi MARA (UiTM), Samarahan and Samarahan 2 campuses, Sarawak, participated. Data were collected using a 28-item questionnaire covering five TAM constructs: perceived ease of use, perceived usefulness, attitude, behavioural intention, and perception. The results showed consistently high levels of agreement, with mean scores ranging from 4.39 to 4.61 on a 5-point Likert scale. Ease of use scored highest ($M = 4.61$), indicating that GS was easy to access, especially via mobile devices. Students also described the platform as flexible, engaging, and supportive of learning. An independent t-test revealed significant gender differences in ease of use and usefulness, with female students reporting higher scores, while no differences were found in attitude, intention, or perception. Overall, GS was a practical, well-received platform that provided useful insights for educators and suggested future comparisons with platforms such as Google Classroom (GC).

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1. INTRODUCTION

In recent years, integrating digital platforms into higher education has transformed how students engage with learning materials, collaborate with peers, and communicate with lecturers. Among these platforms, Google Sites (GS) has emerged as a free, accessible and customisable tool that allows lecturers to design interactive learning environments without requiring advanced technical skills. Despite its growing use in academic settings, research on how students perceive GS as a learning platform remains limited, particularly in the Malaysian higher education context. Most existing studies on digital learning platforms focus on Google Classroom (GC), highlighting its widespread adoption and integration across educational settings. However, understanding students' acceptance of GS is crucial for improving instructional design and ensuring meaningful engagement with digital tools. To address this gap, this study adopts the Technology Acceptance Model (TAM) as a research framework to examine students' acceptance and engagement with GS. TAM proposes that perceived ease of use and perceived usefulness influence users' attitudes, intentions and actual usage. By applying TAM, this study captures both the technical and experiential dimensions of students' engagement with GS and extends the model by incorporating perception as a mediating factor between intention and actual engagement.

Figure 1 illustrates the GS mobile interface as students experience it during mathematics and statistics courses. The platform presents a clean, collapsible sidebar menu that organises content into weekly lessons (Week 1 to Week 14), supporting structured and sequential learning. Key features include access to lecture notes, submission links and other academic links and assessment tools, allowing students to navigate academic resources efficiently. The inclusion of continuous assessment marks (carry marks), tutorials and statistical project guidelines further supports continuous assessment and collaborative learning. The interface also integrates a course description section, providing students with contextual information about the subject, learning outcomes and weekly lesson plans. This layout highlights GS's key strengths, including its mobile-friendly design, user-friendly navigation, and content organised by weekly topics. Moreover, these features align with Google Sites' broader capabilities, including drag-and-drop design, real-time collaboration and seamless integration with other Google services such as Google Forms and Google Calendar.

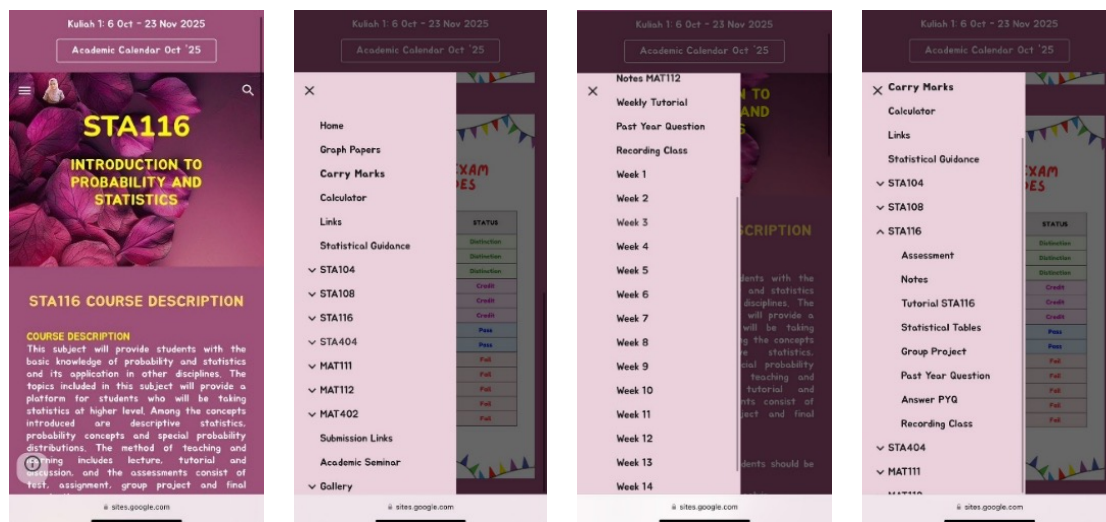


Figure 1 Google Sites platform as accessed via mobile phone
Source: Author (2026)

1.1 Objectives

Guided by TAM, this study aims to explore the acceptance of GS as a digital learning platform for Mathematics and Statistics courses among diploma and degree students. As digital tools become increasingly incorporated in higher education, understanding how students perceive and engage with these platforms is essential for designing effective learning environments. Specifically, this study aims to:

- (i) Examine students' perceptions of GS in terms of ease of use and usefulness
- (ii) Assess students' attitudes and behavioural intentions toward its continued use
- (iii) Explore potential gender differences, particularly in perceived ease of use and usefulness

1.2 Limitations

This study adopted a convenience sampling method restricted to students from a single branch campus, specifically those enrolled in Mathematics and Statistics courses during the data collection period. Accordingly, the findings cannot be generalised to all students from other faculties, institutions, or regions. The sample reflects the perspectives of a particular cohort and may not adequately capture the diversity of perceptions across disciplines. Furthermore, the sample demonstrated a gender imbalance, as male students were underrepresented in this study. This imbalance may have influenced the overall outcomes and limited the representativeness of the study's findings.

2. LITERATURE REVIEW

2.1 Recent Applications of TAM in Higher Education

The Technology Acceptance Model (TAM), introduced by Davis (1989), remains a foundational framework for understanding how users adopt digital tools. In higher education, TAM has been widely applied to evaluate students' acceptance of e-learning platforms, especially during the COVID-19 pandemic when digital learning became essential. Rosli et al. (2022) conducted a systematic review highlighting TAM's relevance in sustaining online education, while Abdullah and Mohd Zaid (2023) explored artificial intelligence (AI) adoption in research contexts, reinforcing the model's adaptability. Gender differences in technology adoption are also well-documented, with Venkatesh and Morris (2000) showing that female students often rely more on perceived ease of use, while male students emphasise usefulness. These insights support including gender as a variable in TAM-based studies.

TAM has expanded significantly during the transition from pre-COVID-19 to post-COVID-19, driven by digital transformation in higher education. In its early stages, TAM focused on perceived usefulness and perceived ease of use. With the rise of e-learning platforms, flipped classrooms, and generative artificial intelligence (AI) tools, researchers added constructs to the core TAM framework to provide a more comprehensive analysis. Rosli et al. (2022) systematically reviewed the transition of TAM applications from the pandemic to the post-pandemic period, showing that emergency remote teaching catalysed the incorporation of socio-psychological factors such as self-efficacy, subjective norms, and institutional support into the extended TAM. Driven by the restructuring of the tertiary education ecosystem in the post-pandemic period, automated learning platforms and generative AI have been integrated into tertiary teaching and learning environments. This transformation has prompted researchers to extend TAM to examine trust, cross-cultural perceptions, and digital literacy as key determinants of students' attitudes and intentions to use these systems (Ma et al., 2024; Ravšelj et al., 2025). In addition, recent empirical investigations of active learning frameworks, such as flipped language learning, highlight that pedagogical design directly influences perceived ease of use and students' engagement with educational platforms (Lau et al., 2024). Musa et al. (2024), in their re-evaluation of demographic variables in post-2020 research, found that gender moderates students' behavioural intentions, with students demonstrating divergent priorities regarding usability and functionality across emerging educational technologies. As a result, recent research on tertiary education has shifted toward a modified or extended TAM to reflect students' engagement with emerging educational technologies.

2.2 Student Engagement with Online Learning Platforms

In recent years, digital platforms have become increasingly essential in higher education, with universities worldwide relying more heavily on Learning Management Systems (LMS) such as Canvas, Google Classroom, Microsoft Teams, and Moodle to support teaching and learning processes (Djafri et al., 2025). These platforms offer integrated solutions for course delivery, discussion, and assessment, supporting synchronous and asynchronous learning. Studies by Runiasih et al. (2025) and Susiana and Priyatin (2025) show that LMS significantly enhance accessibility, allowing learners to engage with materials anytime and anywhere, thereby promoting both independent and collaborative learning. Beyond content management, LMS also includes analytics and feedback tools that enable instructors to monitor student progress and customise instruction, making them vital in the current digital learning environment (Kusuma et al., 2025). Additionally, other open-access digital platforms such as Coursera, EdX, and Khan Academy have made education more accessible by offering high-quality courses from around the world (Isaeva et al., 2025). These platforms support interactive learning, multimedia, and immediate feedback, which benefit courses like Mathematics and Statistics where conceptual understanding is crucial. This also shows that the world has shifted toward student-centred, technology-driven learning, allowing learners to study at their own pace while engaging with interactive content. In Malaysia, similar trends are evident, with universities increasingly adopting digital platforms to deliver courses across disciplines. Most local universities have implemented Google Classroom to manage weekly lesson plans, assessments and group projects in line with the Ministry of Higher Education's call for blended learning approaches (Kassim, 2024). These digital platforms not only ensured educational continuity during disruptions such as the COVID-19 pandemic, but also supported accessibility, flexibility, and classroom engagement.

The expansion of digital learning platforms has captured students' interest, encouraging them to engage with these tools and reflect on their learning experiences. Platform usability is also important, as it shapes students' engagement and achievement. Research in higher education has shown that various factors influence students' perceptions of these learning platforms. Almusharraf (2024) emphasises that ease of navigation, interactivity, and the delivery of relevant content that support diverse learning preferences enhance engagement. Similarly, Chuenyindee et al. (2022) integrated the Technology Acceptance Model, Task-Technology Fit, and the System Usability Scale to show that perceived ease of use significantly influenced perceived usefulness, which in turn positively influenced students' perceived satisfaction with the platforms. More recently, Linus et al. (2025) further echoed these perspectives by demonstrating that students' perceptions of usefulness and ease of use are strongly correlated with their intention to adopt online learning tools.

The effectiveness of educational platforms depends not only on their content but also on how easily and intuitively users can interact with them. A pilot study conducted by Syamala et al. (2025) specifically emphasises that interface design elements, such as visual design, content organisation, functionality, and well-defined objectives of the educational platform, significantly affect users' experiences with digital learning platforms. Mujiono et al. (2025) noted that improving e-learning platforms requires careful attention to both User Experience (UX) and User Interface (UI), as these elements play a pivotal role in shaping learner interaction. Their study highlighted that UI and UX matter in e-learning because they can improve user engagement by simplifying access to learning resources and enabling users to complete academic tasks with minimal friction. The repeated use of the User Experience Questionnaire (UEQ) in studies by Saleh et al. (2022) and Attan et al. (2024) highlights the importance of effective user experience design in educational platforms. Saleh et al. (2022) emphasised the need to address both functional and emotional aspects of UX when designing and enhancing the learning management system. Similarly, Attan et al. (2024) measured UX that incorporates both pragmatic (usability) and hedonic (visual) quality, as well as learning satisfaction. Their findings revealed a significant positive correlation between UX and learning satisfaction, highlighting the impact of effective UX design on educational platforms.

2.3 Google Sites in Education

Researchers have widely explored integrating GS into educational contexts, with studies consistently highlighting its accessibility, ease of use, and potential to enhance student engagement. Ravsanjani et al. (2026) conducted a systematic literature review. They concluded that GS can serve as a practical alternative to traditional Learning Management Systems (LMS), particularly due to its mobile responsiveness and low implementation cost. Similarly, Halim and Halim (2024) emphasised GS's role in promoting collaborative learning and resource sharing, while also noting limitations in advanced LMS functionalities.

At the school level, GS has been applied to support interactive learning approaches. Ramasundrum and Sathasivam (2022) studied GS's influence on science achievement among Year Five students. The findings showed improvements in learning outcomes and student participation compared with conventional approaches. The observed improvement was attributed to GS's adaptability and interactivity, supported by the integration of videos and online notes. Meanwhile, Sakinah et al. (2025) developed interactive media using GS within a problem-based learning model and found that it improved students' engagement and fostered independent learning. Likewise, Arrahma et al. (2025) demonstrated that GS as a web-based medium enhanced students' conceptual understanding of science topics, particularly in materials related to substances and their changes.

In higher education, Amat et al. (2025) investigated the adoption of GS among UiTM Kedah students using TAM constructs. Their findings revealed high ratings for perceived usefulness and ease of use, reinforcing GS's suitability as a mobile-friendly platform for university-level learning. Collectively, these studies suggest that GS not only supports flexible, mobile-based learning but also aligns closely with TAM dimensions of perceived ease of use and usefulness, strengthening its role as an accessible and engaging educational tool across diverse learning environments. Recent research also suggests that GS has collaborative potential when it is integrated with other Google applications, rather than used as an independent tool. Lee et al. (2024) found that combining GS with other Google applications such as Google

Classroom, Google Slides, Google Docs, and Google Forms created an asynchronous environment that supported students' self-directed learning and collaboration. Similarly, Patihah and Pramuditya's (2026) study focused on using GS in promoting student-centred learning in Mathematics. Their findings showed that GS encourages independent learning through accessible technology and effective instructional approaches. In language learning, Suharti et al. (2023) found that employing GS as a primary instructional medium effectively boosted students' writing scores.

2.4 Extended Models (TAM2 and UTAUT) in Higher Education and e-Learning

The Technology Acceptance Model 2 (TAM2) extends the classical TAM by incorporating social influence (subjective norm, image) and cognitive instrumental processes (job relevance, output quality, result demonstrability). Recent studies highlight its relevance in digital learning contexts. Yulianti et al. (2026) demonstrated that learning motivation mediates the relationship between TAM2 constructs and e-learning achievement, underscoring the importance of intrinsic factors in technology adoption. Similarly, He et al. (2023) integrated TAM2 with social support theory, showing that educational and emotional support significantly influence students' acceptance of e-learning platforms. These findings suggest that TAM2 provides a richer explanatory framework by acknowledging the social and motivational dimensions of technology use in education.

The Unified Theory of Acceptance and Use of Technology (UTAUT) synthesises TAM, Theory of Planned Behaviour (TPB), and other models, introducing performance expectancy, effort expectancy, social influence, and facilitating conditions. Recent scholarship has applied UTAUT extensively in higher education. Mai and Khairani (2026) conducted a bibliometric analysis of UTAUT research, revealing its growing importance in the era of AI and ChatGPT, where performance expectancy remains the strongest predictor of adoption. Younas et al. (2026) extended UTAUT2 by incorporating digital literacy and privacy concerns, showing that these factors are critical in shaping next-generation technology adoption in universities. Rosli et al. (2022) provided a systematic review of TAM and UTAUT applications during the COVID-19 pandemic, identifying gaps in sustainability and cross-cultural validation. Fan (2023) further illustrated UTAUT's adaptability by examining English learning motivation through TAM constructs on social media platforms, linking behavioural intention to cultural context. Together, these studies suggest that while TAM2 enriches the classical TAM with social and motivational dimensions, UTAUT offers a comprehensive framework for understanding technology adoption in higher education. By situating this study within the broader evolution of TAM, this study acknowledges the theoretical depth of extended models while maintaining TAM's simplicity as a guiding framework. This positioning allows the study to contribute to ongoing debates about how acceptance models may need to adapt to emerging technologies and contextual factors in digital learning.

2.5 Empirical Studies on TAM in Educational Contexts

TAM provides a solid basis for understanding students' acceptance of digital learning technologies. However, recent research shows that acceptance and engagement extend beyond the classical TAM concepts of perceived usefulness and perceived ease of use. Previous research on TAM applications has focused on external factors to explain students' acceptance of e-learning, such as self-efficacy and perceived enjoyment (Abdullah & Ward, 2016; Salloum et al., 2019). More recent empirical studies further illustrate the significance of perceived enjoyment in affecting students' attitudes and behavioural intentions toward digital learning technologies (AlDreabi et al., 2023), and technological self-efficacy and perceived trust have also been found to affect students' use of ICT-based learning tools (Xu et al., 2024). Institutional factors become increasingly important, as educational and emotional support have been shown to foster students' intention to use digital learning technologies (Alshammari & Alkhwalidi, 2025). These findings suggest that students' perceptions of usefulness and ease of use are not the only factors affecting their acceptance of and engagement with digital learning platforms; their confidence, enjoyment, trust and support within the learning environment may also play a role. These additional factors provide a broader lens for examining students' adoption and engagement in GS in higher education.

Furthermore, gender emerges as a significant factor in shaping technology adoption behaviours, particularly within the TAM framework. Venkatesh and Morris (2000) demonstrated that female users tend to prioritise perceived ease of use, whereas male users place greater emphasis on perceived usefulness. Ong and Lai (2006) further revealed that gender influences emotional engagement and usability perceptions in e-learning environments, with female students showing stronger affective responses. Kaur and Kaur (2022) confirmed that gender moderates the relationship between TAM constructs in digital adoption contexts, highlighting the differential impact of ease of use across gender groups. Complementing these findings, Qazi et al. (2022) conducted a meta-analysis that identifies consistent gender-based disparities in ICT usage and digital competencies. Taken together, these studies highlight gender's critical role as a moderating factor in TAM assessments, especially when evaluating student interaction and engagement with digital platforms such as Google Sites in higher education.

Recent studies also show that TAM effectively explains students' acceptance of educational technologies. Researchers using TAM on popular learning platforms such as Google Classroom, the Metaverse, and Moodle found that perceived usefulness and ease of use are key factors influencing students' intention to use them (Tuffahati & Nugraha, 2021; Al-Adwan et al., 2023; Balaskas et al., 2025). However, few empirical studies have applied TAM to GS, leaving limited evidence on students' acceptance of GS as a learning platform. This gap highlights the need to investigate further students' views on GS, especially regarding student interaction and engagement with the platform in higher education.

3. METHODOLOGY

3.1 Research Framework

This study adopts the Technology Acceptance Model (TAM), as shown in Figure 2, originally developed by Davis (1989) to explain and predict user behaviour toward information technology. TAM theorises that perceived ease of use and perceived usefulness influence attitude towards use, which subsequently affects behavioural intention to use a given technology. These constructs have been widely validated across educational and organisational contexts, particularly in studies involving e-learning platforms and digital tools.

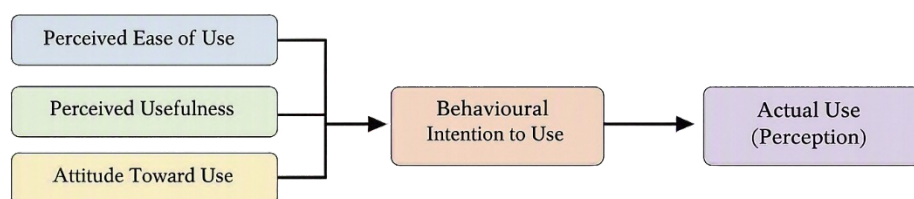


Figure 2 *The research framework of TAM*
Source: Davis (1989)

In this study, TAM is expanded to incorporate an additional construct, namely perception, which reflects students' overall impressions and satisfaction with GS as a learning platform. The authors selected GS because of its accessibility and simplicity. By incorporating this construct, the framework provides a more comprehensive understanding of how students evaluate the platform, based not only on its technical features but also on their personal experiences and responses while using it.

3.2 Sampling and Respondents

A total of 251 diploma and degree students enrolled in Mathematics and Statistics courses at UiTM, Samarahan and Samarahan 2 campuses, Sarawak participated in this study. Data collection spanned from October 2021 to July 2025 academic sessions to ensure a broad and representative sample of students who engaged with GS. This extended timeframe enabled the inclusion of feedback from diverse academic backgrounds, thereby strengthening the validity of the findings. Throughout this period, the GS interface, design and content underwent continuous refinement to enhance visual appeal and foster student engagement.

Students in this study were enrolled in various academic programmes, including AM110 (Diploma in Public Administration), AC110 (Diploma in Accountancy), AS120 (Diploma in Applied Science), CS110 (Diploma in Computer Science), IC120 (Diploma in Halal Management), and AM238 (Bachelor in Administrative Science). They span semesters 1 to 5, reflecting a diverse range of academic backgrounds. Students were selected through convenience sampling, with the common criterion that they actively engaged with the same GS platform as part of their learning experience in Mathematics and Statistics-related courses. Throughout each 14-week semester, students interacted with course materials and activities delivered via GS, including accessing lecture notes, submitting assignments and participating in collaborative tasks such as group-based statistical reporting. Including students from multiple programmes and semester levels provides a comprehensive perspective on how students across disciplines and academic stages perceive the platform. At the end of the semester, particularly week 14, a structured questionnaire was administered to collect students' feedback. This timing ensured adequate exposure to the platform, enabling a reflective and informed evaluation of its usability, accessibility and overall effectiveness as a digital learning tool. Students were given one week to complete the questionnaire after the link was shared. To maximise participation, students involved in the study were reminded to submit their responses

3.3 Research Instrument

This study employed a structured questionnaire as the primary research instrument to measure students' acceptance of GS as a learning platform. The questionnaire was designed based on the constructs of the TAM and includes 28 items distributed across five constructs. Table 2 in Section 4.2 outlines and summarises these constructs. In addition, the questionnaire includes a demographic section designed to capture background information about the students, including gender, group, course taken and current semester of study. These demographic variables provide contextual information about the sample's diversity and allow subgroup analyses where relevant.

3.4 Statistical Analysis

To ensure the validity and interpretability of the findings, several statistical analyses were employed. First, a reliability analysis used Cronbach's alpha to assess the internal consistency of items within each TAM construct, followed by factor analysis to examine construct validity. Next, descriptive statistics summarised the data, including mean scores and standard deviations, providing an overview of students' responses across constructs. Additionally, mean scores were calculated for each construct by averaging the respective item responses. This approach treated ordinal Likert-scale data as continuous, enabling more meaningful interpretation and supporting parametric methods. To examine potential gender-based differences, an independent t-test was performed. Before this, we verified the assumption of normality using boxplots and normal Q-Q plots, confirming that the data distribution was suitable for parametric testing, as well as the skewness value. Together, these analyses provided a comprehensive understanding of students' acceptance of GS and ensured the robustness and reliability of the statistical conclusions.

4. RESULTS AND ANALYSIS

4.1 Demographic Analysis

A total of 251 diploma and degree students participated in this study. As shown in Table 1, most respondents were female (71.7%), while male students comprised 28.3% of the sample. By area of study, 59.8% of students were enrolled in Mathematics-related courses, and 40.2% were taking Statistics-related courses. This distribution reflects the study's emphasis on students engaged in quantitative subjects where GS was used as a learning platform. The 251 respondents came from various academic sessions spanning October 2021 to July 2025. This diversity across gender, courses, and academic sessions improves the sample's representativeness and allows for a more detailed understanding of students' perceptions and patterns of technology acceptance.

Table 1 Descriptive statistics of demographic profile

Demographic		Frequency	Percentage
Gender	Male	71	28.3%
	Female	180	71.7%
Course	Mathematics (MAT112, MAT402)	150	59.8%
	Statistics (STA104, STA108, STA116)	101	40.2%
	Total	251	100%

4.2 Reliability Analysis and Construct Validity

To assess the questionnaire's internal consistency, Cronbach's alpha values were calculated for each construct. As shown in Table 2, all five constructs demonstrated high reliability, with Cronbach's alpha values ranging from 0.857 to 0.908, exceeding the commonly accepted threshold of 0.70 (Tavakol & Dennick, 2011). Specifically, perceived usefulness and behavioural intention to use exhibited the highest reliability, indicating strong consistency among items within these constructs. These results indicate satisfactory internal consistency for measuring students' acceptance of GS as a learning platform through the lens of the TAM. All items were rated on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Because individual Likert-scale items produce ordinal data, a composite mean score was calculated for each construct by averaging responses to its respective items. This approach allows the use of parametric statistical methods such as t-tests and regression analysis by treating the aggregated scores as continuous data, thus enhancing the reliability and interpretability of the findings.

Table 2 Results of reliability analysis

Construct	Number of Items	
Cronbach's Alpha		
Perceived ease of use	5	0.857
Perceived usefulness	6	0.908
Attitude towards use	6	0.902
Behavioural intention to use	6	0.908
Perception	5	0.900

Confirmatory factor analysis provided evidence supporting the questionnaire's construct validity. The Kaiser-Meyer-Olkin (KMO) value was 0.961, and Bartlett's Test was significant ($\chi^2=5844.6$, $p < .001$), which exceeded the recommended threshold of 0.60 (Kaiser, 1974). Five factors emerged with eigenvalues ($\lambda > 1$), corresponding to the TAM constructs. All items loaded strongly ($> .40$) on their respective factors, indicating good alignment with the intended constructs (Kaiser, 1960). Collectively, the model explained 71.95% of the variance, which is considered satisfactory

4.3 Normality and Descriptive Analysis

Before conducting inferential analyses, the normality of the data was assessed using boxplots and normal Q-Q plots, as well as skewness values reported in Table 4. The skewness values for all five TAM constructs fell within the acceptable range of -1 to $+1$ as reported in Table 4, indicating that the data distributions are approximately normal. Specifically, perceived ease of use, perceived usefulness, attitude towards use, behavioural intention to use and perception all exhibited slight negative skewness, indicating a tendency for responses to cluster towards higher agreement levels on the Likert scale. Figure 3 presents the boxplots, which show a left skew with minimal outliers and no extreme deviations; normal Q-Q plots are not included here due to space limitations. For the normal Q-Q plots, the data points aligned closely along the diagonal reference line, indicating that the distributions were approximately normal. This visual evidence supports the assumption that the TAM construct is normally distributed, thereby justifying the use of parametric statistical tests in subsequent analyses.

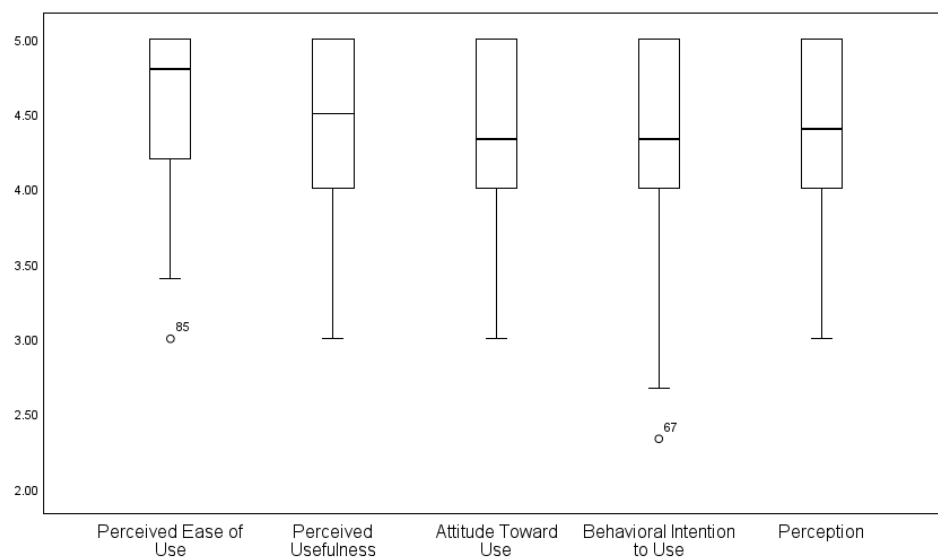


Figure 3 Boxplots of the TAM constructs
Source: Author (2025)

To interpret the questionnaire mean scores, this study adopted the classification framework proposed by Hassan et al. (2020), as shown in Table 3. The scale categorises mean values into five levels, from very low to very high. This interpretation guided the analysis of students' responses across the TAM constructs, providing a clearer understanding of their perceptions and attitudes towards GS as a learning platform.

Table 3 Interpretation of mean score

Mean Score	Level of Agreement
1.00 – 1.80	Very low
1.81 – 2.60	Low
2.61 – 3.40	Moderate
3.41 – 4.20	High
4.21 – 5.00	Very high

Source: Hasan et al. (2020)

Table 4 presents the descriptive statistics for the five TAM constructs measured in this study. The results showed that students reported very high agreement across all constructs, with mean scores ranging from 4.39 to 4.61 on a 5-point Likert scale. Perceived ease of use recorded the highest mean ($M=4.61$, $SD=0.44$), suggesting that students perceived GS as highly user-friendly and easy to navigate. Perceived usefulness ($M=4.49$, $SD=0.49$) and attitude towards use ($M=4.39$, $SD=0.53$) followed closely, indicating strong positive evaluations of the platform's effectiveness and relevance to learning. Behavioural intention to use ($M=4.39$, $SD=0.53$) and perception ($M=4.46$, $SD=0.49$) also showed consistently high scores, reflecting students' willingness to continue using GS and their overall satisfaction with the platform. The relatively low standard deviations across all constructs suggest strong agreement among respondents. Overall, these findings support the conclusion that students accept GS as a learning tool for Mathematics and Statistics, aligning with TAM's core principles.

Table 4 Descriptive statistics of TAM constructs

Construct	Skewness	Std. Deviation (SD)	Mean (M)	Level of Agreement
Perceived ease of use	-0.760	0.44	4.61	Very high
Perceived usefulness	-0.418	0.49	4.49	Very high
Attitude towards use	-0.326	0.53	4.39	Very high
Behavioural intention to use	-0.447	0.53	4.39	Very high
Perception	-0.295	0.49	4.46	Very high

Due to space limitations and the inclusion of 28 items, this report does not present the mean scores for each item within every construct. The results show consistently high agreement across all items, indicating strong student acceptance of GS as a learning platform. Under perceived ease of use, item 'Google Sites is available on mobile phones, so students can easily access the learning materials' recorded the highest mean score ($M=4.70$), suggesting that students find the platform highly accessible and user-friendly, likely due to their frequent daily use of mobile phones. Other items in this construct also scored above 4.40, reinforcing the perception of ease in navigation, mobile compatibility and content retrieval. For perceived usefulness, item 'Google Sites allows me to access content anytime, anywhere' received the highest rating ($M=4.61$), highlighting the platform's flexibility and convenience. Students also value its role in improving learning efficiency and supporting independent study.

In the attitude towards use construct, item 'I feel positive about using Google Sites for educational purposes' stands out with the highest mean ($M=4.54$), reflecting positive emotional engagement. Other items show strong agreement regarding motivation, enjoyment and willingness to use the platform in future learning contexts. Within the behavioural intention to use construct, item 'I would recommend Google Sites to other lecturers and students for learning purposes' recorded the highest mean ($M=4.52$). This indicates that students not only accept GS for their own learning but were also confident in its value for others. In the context of TAM, this suggests that students not only perceive GS as useful and easy to use, but also demonstrate a willingness to promote its adoption. This behaviour also indicates high satisfaction and trust in GS's effectiveness, which may contribute to its broader acceptance and sustained integration in academic environments. Other items such as exploring new features also showed high levels of agreement, suggesting sustained interest and proactive engagement.

Lastly, for the perception construct, item 'Google Sites can provide new learning experiences' received the highest mean ($M=4.51$), suggesting that students view GS as a source of innovative and engaging instructional support. Additionally, items related to learning effectiveness, guidance and assignment management all scored above 4.40, indicating that students perceive GS as a valuable and adaptable tool for their educational experience.

Collectively, the item-level analysis across all five TAM constructs showed consistently high mean scores, low standard deviations, and high student acceptance of GS. These findings indicate positive perceptions of the platform in terms of ease of use, usefulness, attitude towards use, behavioural intention to use and overall learning experience, supporting its potential use as a digital learning platform for Mathematics and Statistics education.

Table 5 Results of independent t-test

Construct	Gender	Std. Deviation (SD)	Mean (M)	Levene's F-Test	Independent t-Test
Perceived ease of use	Male	0.48	4.51	6.905	-2.109
	Female	0.42	4.64	(0.009)*	(0.037)*
Perceived usefulness	Male	0.53	4.37	3.385	-2.485
	Female	0.46	4.54	(0.067)	(0.014)*
Attitude towards use	Male	0.56	4.33	1.437	-1.223
	Female	0.52	4.42	(0.232)	(0.223)
Behavioural intention to use	Male	0.54	4.35	0.503	-0.823
	Female	0.53	4.41	(0.479)	(0.411)
Perception	Male	0.52	4.38	0.865	-1.518
	Female	0.48	4.49	(0.353)	(0.130)

Note: Values in parentheses indicate a significance value for the test. *Significant at the 5% level.

Table 5 presents the results of an independent t-test examining gender-based differences across the five TAM constructs. The analysis compared mean scores between male and female students. Across all constructs, female students consistently reported slightly higher mean scores than their male counterparts. For example, perceived ease of use showed a mean of 4.64 for females compared to 4.51 for males, with a statistically significant difference ($t = -2.109$, $p < .05$), suggesting that female students perceive GS as more user-friendly. Female students may demonstrate greater digital fluency, leading to more intentional engagement with platform features and navigation tools. This observation aligns with findings by Ong and Lai (2006), who reported that female learners are more influenced by perceptions of computer self-efficacy and ease of use, often showing stronger attention to detail and task organisation in digital learning environments. In addition, perceived usefulness of GS differed significantly between male and female students ($t = -2.485$, $p\text{-value} < .05$). Within TAM, perceived usefulness is one of the most important factors shaping a person's attitude and decision to use a technology. Results from this study indicated that female students are more likely to believe that GS helps them to learn more effectively. This may be due to past experiences with technology, confidence in using online platforms or their personal learning styles. To support students equally, lecturers can provide extra help, tips, or examples so male students can better see how GS supports learning. Helping all students see the platform's benefits can lead to more widespread and consistent technology use in learning. For the remaining constructs, attitude towards use, behavioural intention to use and perception, the differences in mean scores are not statistically significant ($p\text{-value} > .05$). Levene's F-test confirms the assumption of equal variances for all constructs. These findings also imply that while both genders generally accept GS positively, female students demonstrate a significantly stronger perception of ease of use, which may influence their overall engagement with the platform.

5. CONCLUSION

The findings clearly show that students strongly accept GS as a learning platform for Mathematics and Statistics, as measured through the Technology Acceptance Model (TAM). High mean scores across all five constructs, namely perceived ease of use, perceived usefulness, attitude towards use, behavioural intention to use, and perception, suggest that students find GS intuitive, beneficial, and engaging. The highest-rated item, 'Google Sites is available on mobile phones, so students can easily access the learning materials', highlights the importance of mobile accessibility in shaping ease of use. This reinforces Davis's (1989) assertion that simplicity and convenience are critical determinants of user acceptance. Mobile-friendly access not only improves usability but also supports flexible learning, enabling students to engage with course materials anytime and anywhere, which is particularly valuable in resource-constrained or geographically dispersed learning environments. Students strongly agreed that GS lets them access content anytime and anywhere and that they enjoy using it for their studies. This shows both practical benefits and positive feelings toward the platform, in line with earlier research (Tavakol & Dennick, 2011; Venkatesh & Bala, 2008). The analysis also found differences between male and female students, with females giving higher ratings for ease of use and usefulness. This suggests that gender may influence how students experience digital learning tools. Similar results have been reported in past studies (Ong & Lai, 2006), so including gender in TAM evaluations helps explain how different groups interact with online learning platforms.

Beyond confirming expected TAM relationships, these findings carry broader implications for institutional digital strategy. Universities should prioritise mobile-responsive, user-friendly platforms, as these features directly influence students' willingness to adopt and sustain engagement. Training initiatives for lecturers could further enhance the integration of GS into teaching practices, ensuring that its perceived usefulness translates into improved learning outcomes. Additionally, female students rated ease of use and usefulness higher, suggesting that institutions should adjust support and resources to meet the needs of different student groups and ensure fair digital engagement. At the same time, this study has limitations. The reliance on self-report measures may introduce bias, as students could overstate positive attitudes. Furthermore, the cross-sectional design captures perceptions at a single point in time, limiting insights into how acceptance evolves with prolonged use. Future studies should follow students over time to see how their engagement changes, and use methods like interviews or usage tracking to confirm the results and provide a fuller picture. Comparative studies across faculties or institutions could also help generalise the results and refine digital strategies for diverse student populations.

6. RECOMMENDATIONS

These results have practical implications for educators and instructional designers. The high levels of acceptance suggest that GS may be considered for integration into course delivery, especially for quantitative subjects. Its accessibility, flexibility, and ease of use make it a suitable platform for promoting student-centred learning, self-paced study, and collaborative engagement. Future research could investigate the long-term impact of GS usage on students' academic performance or conduct comparative analyses with alternative platforms such as Google Classroom (GC) or Microsoft Teams to evaluate relative effectiveness. Moreover, incorporating qualitative methods may provide richer insights into students' lived experiences, learning behaviour and platform preferences. Future studies should also go beyond platform-specific comparisons and use extended acceptance models. TAM2 shows how peer influence and relevance affect adoption, UTAUT highlights the role of institutional support and performance expectancy, and TPB explains how attitudes, social norms, and confidence shape students' intentions. These frameworks can provide deeper insights into why students accept or resist platforms like GS and how motivation, social factors, and infrastructure interact in higher education.

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8. AUTHORS' CONTRIBUTIONS

Juliza Salleh: Methodology, data collection; formal data analysis; writing- original draft; writing-review and editing. Lai Tze Wee, Lee Siaw Li, Shirley Sinatra Gran, Syah Runniza Ahmad Bakri: Validation; literature review; project administration; writing-original draft; writing-review and editing.

9. CONFLICT OF INTEREST DECLARATION

The authors declare that this research was conducted independently, without any financial, commercial, or personal conflicts of interest.

10. DECLARATION OF GENERATIVE AI IN THE WRITING PROCESS

The authors employed Microsoft Copilot and Google Gemini to assist with text rephrasing. The authors carefully reviewed all outputs generated by these tools to ensure accuracy and integrity.

11. DATA AVAILABILITY/SUPPLEMENTARY MATERIALS

The datasets generated and analysed during this study are available from the corresponding author upon reasonable request.

12. ETHICS STATEMENT

The authors affirm that this study was conducted with voluntary participants who provided informed consent. The authors safeguarded respondents' anonymity and confidentiality throughout all stages of the research process.

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