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Comparative Study of Microsoft 365 and Google Workspace Usage among Education Students in Malaysia

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Abstract: *The rapid digitalisation of higher education has intensified the reliance on cloud-based collaboration platforms, particularly within teacher-education programmes where coursework increasingly demands synchronous communication, shared document development, and seamless cross-device access. This study systematically evaluates the utilisation patterns and perceived functional quality of Google Workspace and Microsoft 365 among students enrolled in diploma, undergraduate, postgraduate, and doctoral-level education programmes in Malaysia. Aligned with this purpose, the research further compares collaborative efficiency, accessibility affordances, and productivity-related features of both platforms. A total of 107 respondents from major institutions, including Universiti Sultan Zainal Abidin (66.4 percent), Universiti Kebangsaan Malaysia (16.8 percent), and Universiti Pendidikan Sultan Idris (10.3 percent), participated in the survey, with a gender distribution of 52.3 percent male and 47.7 percent female students. Quantitative analysis reveals a distinct dichotomy between usage and preference. Findings indicate strong engagement with both ecosystems: 87.9 percent actively use Google Workspace, primarily for collaborative writing via Google Docs, whereas Microsoft 365 reports a higher utilisation rate of 98.1 percent, with OneDrive emerging as the primary tool for organised and secure file management. Preference analysis reveals that Google Workspace, chosen by 65 respondents, excels in lightweight accessibility and real-time multi-user editing, while Microsoft 365, preferred by 42 respondents, is valued for its advanced formatting precision, offline functionality, and robust security features. Qualitative feedback highlights recurring challenges, including internet dependency, subscription constraints, functional limitations within Google Workspace, and device-specific usability issues associated with Microsoft 365. The study recommends structured digital-literacy training, curriculum-embedded platform integration, improved offline capabilities, and strengthened institutional infrastructure to elevate digital collaboration competencies among future educators. Overall, the findings underscore the importance of evidence-based and strategically balanced technological adoption in advancing pedagogical innovation and sustaining effective digital practices within Malaysian higher education.*

Keywords: Cloud Collaboration, Digital Platform Utilisation, Google Workspace, Microsoft 365 Adoption, Educational Technology Practices

1. Introduction

The rapid digitalisation of higher education has fundamentally reshaped academic collaboration, communication, and knowledge production. Cloud-based technologies now constitute a core component of contemporary learning ecosystems by enabling real-time interaction, collaborative document development, and seamless access across multiple devices (Akcil et al., 2021; Qasem et al., 2020). As collaborative and technology-mediated learning becomes increasingly embedded within higher education curricula, institutions have progressively adopted cloud-based productivity platforms to support academic workflows and pedagogical practices.

Among the available platforms, **Google Workspace** and **Microsoft 365** have emerged as the most widely implemented cloud-based ecosystems in universities. Both platforms offer integrated tools for document creation, file sharing, and online communication, positioning them as essential infrastructures for collaborative learning environments (Taneja & Taneja, 2014; Reyna, 2020). Prior research suggests that the adoption and effectiveness of such platforms are closely linked to perceived usability, collaborative affordances, and alignment with instructional practices rather than technological capability alone (Hernández-Sellés et al., 2019; Hsu & Chen, 2021).

The literature further indicates that Google Workspace is commonly associated with intuitive design and strong support for synchronous collaboration, whereas Microsoft 365 is often valued for advanced document formatting and structured file management (Brown, 2017; Emilzoli et al., 2025; Qasem et al., 2019). However, existing studies have largely examined these platforms independently or within non-Southeast Asian contexts, resulting in limited comparative understanding of their relative effectiveness in supporting collaborative learning within specific institutional and infrastructural settings. This contextual gap provides the foundation for the present study, which systematically examines and compares the use of Google Workspace and Microsoft 365 among education students in Malaysian higher education.

1.1 Problem Statement

Despite the widespread institutional adoption of Google Workspace and Microsoft 365, there remains limited empirical clarity regarding how these platforms differentially support collaborative learning, productivity, and user experience among higher education students. Existing studies have demonstrated that Google Workspace facilitates real-time collaboration through tools such as Google Docs and Google Meet, while Microsoft 365 offers strengths in document stability, formatting precision, and enterprise-level file management (Emilzoli et al., 2025; Reyna, 2020). Nevertheless, research has also identified usability challenges associated with Microsoft Teams, particularly in relation to interface complexity and reduced user comfort during collaborative communication (Pal, 2020; Tan, 2022).

A critical limitation in the current body of literature is the tendency to focus on technology adoption or perceived usefulness without sufficiently examining how utilisation patterns, perceived functional quality, collaborative efficiency, and user-reported challenges interact to shape platform preference and learning outcomes (Hsu & Chen, 2021; Ayanwale et al., 2024). Moreover, many studies investigate Google Workspace and Microsoft 365 in isolation, offering limited comparative insight into how students strategically select platforms based on task-specific academic demands (Salih, 2021; Taneja & Taneja, 2014).

Within the Southeast Asian and Malaysian higher education context, infrastructural variability, device accessibility, and institutional digital readiness may further influence students' experiences with cloud-based platforms (Nokhil et al., 2024; Qashou, 2025). However, contextually grounded comparative studies remain scarce, particularly within teacher-education programmes where students' technological experiences are likely to shape their future instructional practices. The absence of such evidence limits institutions' ability to make informed decisions regarding platform integration, digital literacy training, and pedagogical design.

Accordingly, this study addresses these gaps by conducting a systematic comparative investigation of Google Workspace and Microsoft 365 among education students in Malaysia, focusing on utilisation patterns, perceived functional quality, collaborative efficiency, accessibility, productivity features, and experienced challenges.

1.2 Research Objectives

This study aims to examine the utilisation patterns and perceived functional quality of Google Workspace and Microsoft 365 among education students in Malaysia. It further seeks to compare the collaborative efficiency, accessibility affordances, and productivity features of both platforms, while identifying the key challenges and limitations encountered by students in their engagement with cloud-based collaborative technologies.

1.3 Significance of the Study

Theoretical Significance

The study advances theoretical discourse in digital learning by illustrating how collaborative technologies influence cognitive, social, and behavioural aspects of student engagement. It contributes empirical depth to technology acceptance scholarship by demonstrating how perceived usability, accessibility, and real-time collaboration shape platform preference and digital learning outcomes. For educators, the findings offer actionable insights for designing collaborative learning activities, selecting appropriate digital tools, and scaffolding student engagement in technology-mediated environments. Understanding platform strengths and limitations supports evidence-based decisions regarding instructional design and collaborative task structuring. Higher education administrators may utilise the findings to refine digital technology policies, enhance infrastructure readiness, and design targeted training interventions. The results also provide guidance for integrating cloud platforms more effectively into Learning Management Systems (LMS). Given that respondents represent future educators, this study informs the development of digital competencies essential for modern classroom environments. Their platform experiences and preferences provide early indicators of how technology may be integrated into school-level teaching and learning practices.

1.4 Scope of the Study

The study is delimited to 107 education students drawn from Malaysian higher education institutions, namely Universiti Sultan Zainal Abidin, Universiti Kebangsaan Malaysia, and Universiti Pendidikan Sultan Idris, encompassing diploma to doctoral levels and selected through convenience sampling. The investigation is confined to two dominant cloud-based platforms, Google Workspace and Microsoft 365, and examines key variables including utilisation frequency, perceived functional quality, collaborative efficiency, accessibility, productivity features, and user-reported challenges. Data collection was conducted exclusively via online questionnaires, with analysis employing descriptive statistical techniques complemented by qualitative thematic analysis. Contextually, the scope of the study is

restricted to higher education environments and does not extend to secondary education or corporate settings.

1.5 Literature Review

Cloud-based platforms have become foundational components of contemporary digital learning ecosystems, particularly within higher education environments that emphasise collaboration, flexibility, and learner autonomy. Existing scholarship consistently demonstrates that the effectiveness of digital collaboration is not determined solely by technological availability, but rather by the interaction between **platform usability**, **collaborative affordances**, and **technological reliability**. These dimensions collectively shape users' engagement, satisfaction, and productivity within online learning contexts.

Google Workspace in Higher Education

The literature frequently characterises Google Workspace as a collaboration-oriented ecosystem grounded in simplicity, real-time interaction, and low technical barriers. Its browser-native architecture enhances cross-device accessibility and reduces dependency on high-end hardware, making it particularly suitable for diverse student populations. Empirical studies indicate that Google Docs facilitates synchronous co-authoring, immediate feedback, and iterative knowledge construction, aligning closely with constructivist and social learning theories. Similarly, Google Meet has been reported to support fluid communication and informal academic discourse, contributing to higher levels of comfort and participation in group-based tasks.

Beyond functional efficiency, scholars argue that the intuitive interface of Google Workspace lowers cognitive load, allowing learners to focus on content creation rather than system navigation. This characteristic is frequently associated with increased student engagement, especially in collaborative writing and project-based learning environments. However, the literature also acknowledges limitations related to advanced formatting capabilities and restricted offline functionality, suggesting that Google Workspace is optimally suited for early-stage collaboration rather than final-stage document production.

Microsoft 365 in Higher Education

In contrast, Microsoft 365 is predominantly framed within the literature as a productivity-oriented ecosystem designed for structured academic work and enterprise-level document management. Applications such as Word Online and OneDrive are widely recognised for their robustness in formatting precision, version control, and secure file storage. These features render Microsoft 365 particularly advantageous for long-form academic writing, formal documentation, and compliance with institutional formatting standards.

Nevertheless, studies consistently report that Microsoft 365 presents a steeper learning curve, especially for communication and collaboration tools such as Microsoft Teams. Interface complexity, navigation density, and configuration requirements have been identified as factors that may impede seamless collaboration, particularly among users with lower digital literacy. As a result, while Microsoft 365 excels in document stability and productivity, its collaborative experience may be perceived as less fluid compared to more lightweight platforms.

Comparative and Contextual Considerations

Comparative literature emphasises that platform selection in higher education should prioritise **pedagogical alignment rather than technological dominance**. The effectiveness of Google Workspace and Microsoft 365 is shown to be highly task-dependent, shaped by factors such as

the nature of academic activities, users' prior technological experience, digital literacy levels, and the availability of institutional support. Importantly, several scholars highlight the scarcity of comparative empirical studies conducted within Southeast Asian higher education contexts, where infrastructural constraints, device variability, and access disparities may significantly influence platform effectiveness.

This gap underscores the need for contextually grounded investigations that move beyond generalised technological comparisons. By systematically examining utilisation patterns, perceived functional quality, and collaborative outcomes, the present study responds directly to this gap, contributing empirical evidence that reflects the realities of digital learning within Malaysian higher education.

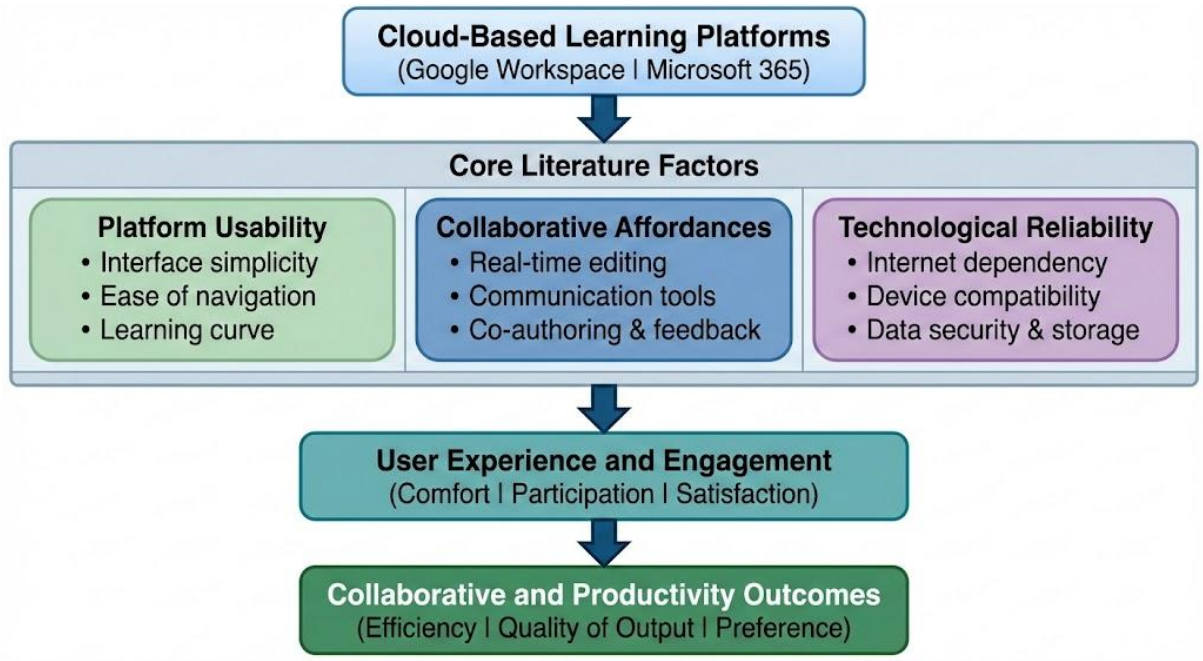

Figure 1: Conceptual Synthesis of Literature on Cloud-Based Collaborative Platforms in Higher Education

This figure illustrates a conceptual synthesis derived from the reviewed literature, highlighting the key dimensions that shape the effectiveness of cloud-based collaborative platforms in higher education. The framework positions platform usability, collaborative affordances, and technological reliability as core determinants influencing user experience and engagement. These factors collectively affect collaborative efficiency, productivity outcomes, and platform preference. The figure provides a theoretical foundation for the present study by linking prior scholarship to the empirical variables examined, thereby strengthening the conceptual coherence of the research.

1.6 Conceptual Framework

The conceptual framework of this study is grounded in established literature on cloud-based collaborative learning, technology acceptance, and computer-supported collaborative learning. It synthesises prior research on platform usability, collaborative affordances, and technological reliability to explain how these dimensions collectively shape students' engagement, collaborative efficiency, and productivity outcomes in digital learning environments.

Within the framework, **Google Workspace** and **Microsoft 365** constitute the core cloud-based platforms under investigation. The framework proposes that students' **utilisation patterns** and **perceived functional quality** of these platforms—encompassing usability, accessibility, and satisfaction—directly influence their **user experience**, including comfort, participation, and engagement in collaborative tasks. These experiential factors are subsequently posited to affect **collaborative and productivity outcomes**, such as efficiency, quality of academic output, and overall platform preference.

The framework further incorporates **technological and contextual constraints**, including internet dependency, device compatibility, and data security considerations, as moderating conditions that may shape students' experiences and perceptions of each platform. Importantly, this conceptual framework directly informed the construction of the survey instrument and guided the analytical focus of the study, ensuring coherence between theoretical grounding, empirical measurement, and interpretation of findings.

2. Methodology

This study employed an enhanced descriptive survey design incorporating quantitative and qualitative methods to compare the usage of Google Workspace and Microsoft 365. This design is highly appropriate as it allows the researcher to systematically characterize and quantitatively measure usage patterns and the perceived functional quality (Creswell & Creswell, 2023), while enriching the findings through qualitative exploration of user limitations and challenges (Frankfort-Nachmias & Leon-Guerrero, 2020).

The study's population consisted of education students across various levels of study in Malaysia. A non-probability convenience sample of 107 respondents was selected, encompassing students from the diploma to doctoral levels, with University Sultan Zainal Abidin (UniSZA ,66.4 percent), University Kebangsaan Malaysia (UKM), and University Pendidikan Sultan Idris (UPSI) among the major institutions represented. The primary research instrument was a standardized self-administered two-part online questionnaire, deployed using the Google Forms platform. The main section utilized a Likert Scale to collect quantitative data on frequency of use and functional quality measurements (usability, functionality, satisfaction) (Sue & Ritter, 2024).

The data collected via Google Forms were analysed using a combination of quantitative and qualitative approaches. Quantitative data were examined using descriptive statistics, including frequencies, percentages, means, and weighted means, to summarise patterns of platform utilisation and perceived functional quality. Qualitative responses obtained from open-ended questions were analysed through thematic content analysis to identify and categorise reported limitations, such as internet dependency, subscription constraints, and device-specific usability challenges. To determine whether the observed differences in utilization and preference between the two platforms were statistically significant, an **Independent Samples T-test** was employed. This inferential analysis allowed the researcher to move beyond descriptive comparisons and empirically verify if the variance in perceived functional quality and collaborative efficiency between Google Workspace and Microsoft 365 was genuine or due to chance. The significance level was set at $\alpha = 0.05$.

This integrated analytical approach provides a comprehensive comparative profile of the strengths and limitations of Google Workspace and Microsoft 365 within the studied context (O'Gorman & MacIntosh, 2020).

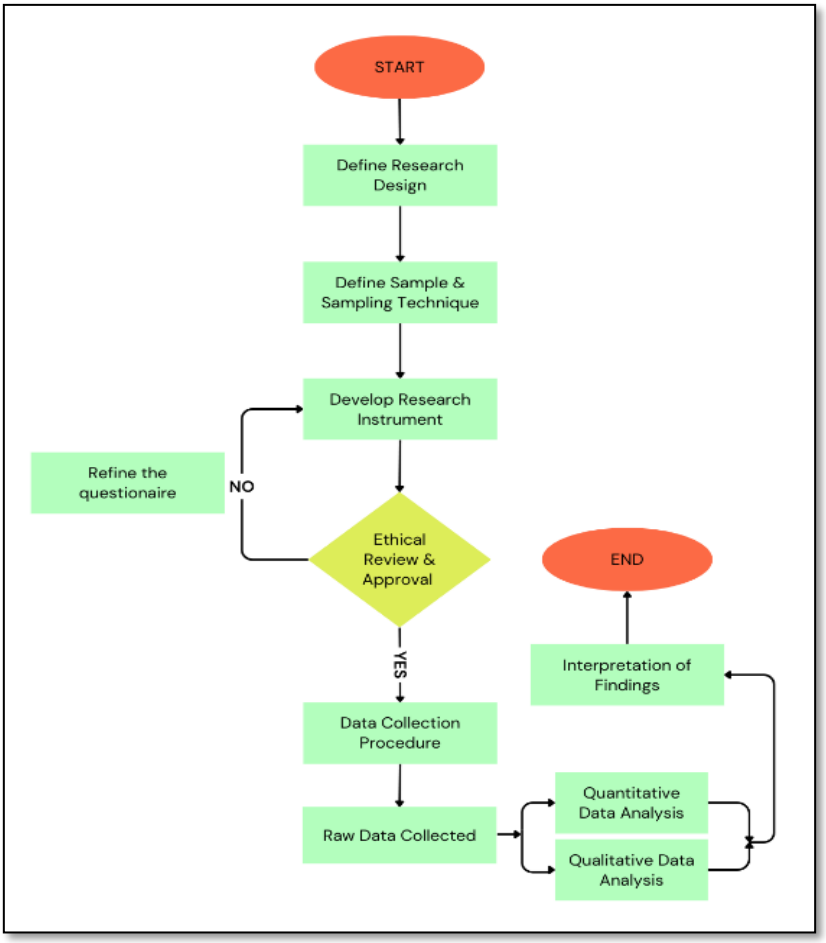

Figure 2: Flowchart Comparative Study of Microsoft 365 and Google Workspace Usage among Education Students in Malaysia

Based on the flowchart figure, the research process began with defining the research design, where a quantitative descriptive survey approach enriched with a qualitative component was selected to characterize and measure platform usage patterns, rather than establishing causal relationships (Creswell & Creswell, 2023). Subsequently, the process of defining the sample and sampling technique was conducted, selecting 107 respondents from education students across various levels (diploma to doctoral) from education institutions using a non-probability convenience sampling method. This step was followed by developing the research instrument, an online questionnaire (Google Forms) structured with Likert Scale items to measure perceived functional quality (e.g., usability and satisfaction), as well as open-ended questions to capture user limitations and challenges (Sue & Ritter, 2024).

Once the instrument was finalized, the ethical review and approval process was undertaken to ensure the study adhered to institutional standards, followed by obtaining informed consent from the respondents. The next stage was survey distribution, where the Google Forms link was disseminated through digital channels to eligible students to collect data. The analysis phase was divided into two parallel branches. First, quantitative data analysis was conducted using descriptive statistics to report the frequency and percentage of platform usage (e.g., 98.1 percent for Microsoft 365). Second, qualitative data analysis was performed through thematic content analysis (Braun & Clarke, 2022) on the open-ended responses to identify and categorize key reported issues, such as internet dependency and functional constraints. This process culminated in the interpretation of findings, where the quantitative and qualitative

results were synthesized and interpreted to provide a comprehensive understanding of the comparative effectiveness of Google Workspace and Microsoft 365, supporting pedagogical innovation and sustainable digital practices (O'Gorman & MacIntosh, 2020).

3. Result and Findings

Table 1: Perceived Utilization and Functional Quality of Google Workspace Among Education Students

Description	Strongly Disagree	Disagree	Agree	Strongly Agree
I frequently use Google Workspace for course assignments.	3.74%	6.54%	22.43%	67.29%
I use Google Docs to prepare collaborative assignments.	0.93%	2.80%	19.63%	76.64%
Google Slides makes it easy for me to prepare presentations with group members.	3.74%	9.35%	30.84%	56.07%
Google Drive makes it easy for me to share files with lecturers or friends.	0.93%	0.93%	13.08%	85.05%
The comment and suggestion functions in Google Docs help with group work.	0.00%	4.67%	20.56%	74.77%
I am comfortable using Google Meet for online discussions.	0.93%	1.87%	15.89%	81.31%
Google Workspace is easily accessible via various devices.	0.93%	4.67%	17.76%	76.64%

The comprehensive analysis of the aggregate survey data collected from the 107 university-level education students conclusively confirms the achievement of the revised first research objective: To evaluate the utilization patterns and perceived functional quality of Google Workspace among education students. The findings establish a pattern of high utilization, evidenced by the fact that nearly 90% of respondents (89.72%) indicate frequent use of Google Workspace for course assignments. This high frequency is underpinned by strong agreement (94.40%) that the platform is easily accessible via various devices. Furthermore, the evaluation of perceived functional quality yielded overwhelmingly positive results, with student satisfaction consistently high across all measured tools. The platform's core utility for file management achieved the highest endorsement, with 98.13% of students agreeing that Google Drive makes file sharing easy (Weighted Mean: 3.822). Collaboration and communication features are equally effective: 97.20% of students reported being comfortable using Google Meet for online discussions (Weighted Mean: 3.776), and over 95% of respondents valued Google Docs for collaborative assignments and its internal comment and suggestion functions. While the statement regarding Google Slides making presentations easy recorded the relatively lowest agreement at 86.91% (Weighted Mean: 3.392), the overall results demonstrate robust and comprehensive evidence that Google Workspace is perceived as both highly utilized and functionally effective, thus fully achieving the first research objective.

The findings demonstrate that Google Workspace is perceived as a highly effective and pedagogically aligned platform for collaborative learning among Malaysian education students. Strong endorsement of Google Docs for group assignments and its commenting and suggestion features highlights the platform's capacity to facilitate real-time collaborative knowledge construction, a fundamental principle of computer-supported collaborative learning (Brown et al., 2017; Hernández-Sellés et al., 2019). High comfort levels with Google Meet further underscore the importance of intuitive synchronous communication tools in sustaining

meaningful academic interaction. Moreover, consistently high ratings for cross-device accessibility support prior evidence that browser-based platforms reduce technological barriers and promote inclusive learning environments (Akcil et al., 2021; Emilzoli et al., 2025). Despite relatively lower agreement regarding Google Slides, the overall pattern confirms that Google Workspace functions as a lightweight, accessible, and collaboration-oriented ecosystem well aligned with interaction-driven pedagogical practices in higher education.

Table 2: Perceived Utilization and Functional Quality of Microsoft 365 Among Education Students

Description	Strongly Disagree	Disagree	Agree	Strongly Agree
I frequently use Microsoft 365 for course assignments.	2.80%	13.08%	27.10%	57.01%
I use Word Online to prepare collaborative group assignments.	6.54%	14.02%	26.17%	53.27%
OneDrive makes it easy for me to save and share files.	0.93%	12.15%	23.36%	63.55%
PowerPoint Online makes it easy for me to prepare group presentations.	5.61%	17.76%	27.10%	49.53%
I am comfortable using Microsoft Teams for group discussions.	8.41%	20.56%	28.97%	42.06%
The real-time synchronization function in Word/PowerPoint helps with group work.	5.61%	10.28%	28.97%	55.14%
Microsoft 365 is easily accessible via various devices.	4.67%	13.08%	27.10%	55.14%

The analysis of the aggregate survey data collected from the 107 university-level education students conclusively confirms the achievement of the second research objective: To evaluate the utilization patterns and perceived functional quality of Microsoft 365 among education students. The findings establish a strong pattern of high utilization, evidenced by the fact that 84.11% of respondents indicate frequent use of Microsoft 365 for course assignments. This high frequency is underpinned by strong agreement (94.40%) that the platform is easily accessible via various devices. Furthermore, the evaluation of perceived functional quality yielded highly positive results, as all tool-specific statements scored at least 3.0 on the weighted mean scale, meaning all were rated as 'Agree' or higher on average. The platform's core utility for file management achieved the highest endorsement, with 86.91% of students agreeing that OneDrive makes file sharing easy (Weighted Mean: 3.496). Collaboration and communication features were also positively reviewed, with 81.38% finding the real-time synchronization function in Word/PowerPoint helpful with group work. However, students' comfort with communication recorded the lowest score, as the statement regarding being comfortable using Microsoft Teams for group discussions received the lowest Weighted Mean score (3.047) and the lowest combined agreement (71.03%). Despite this relative area of lower agreement, the overall results demonstrate robust evidence that Microsoft 365 is perceived as both highly utilized and functionally effective across its major applications, thus fully achieving the second research objective.

The results indicate that Microsoft 365 is widely utilised and positively perceived, particularly for structured academic tasks requiring document precision and systematic file management. Strong agreement regarding OneDrive reflects its effectiveness in secure storage and organised sharing, consistent with comparative studies that associate Microsoft 365 with enterprise-level stability and document control (Salih, 2021; Taneja & Taneja, 2014). Positive perceptions of real-time synchronisation in Word and PowerPoint further suggest that the platform effectively supports collaborative work where formatting accuracy and document integrity are essential.

However, the lower comfort levels associated with Microsoft Teams reveal limitations in communication usability, reinforcing earlier findings that interface complexity and navigation demands may hinder effective interaction in educational contexts (Pal & Vanijja, 2020; Tan et al., 2022). Collectively, these findings suggest that while Microsoft 365 excels in productivity and organisational functionality, its collaborative communication tools require pedagogical scaffolding to fully support collaborative learning.

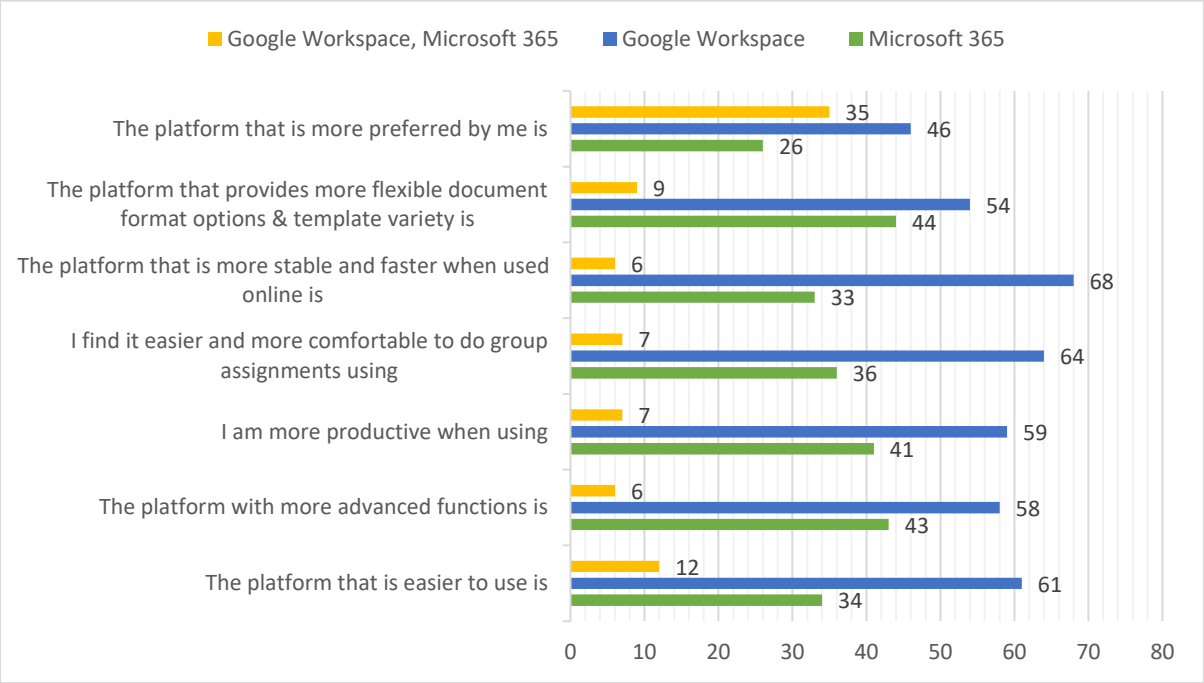

Figure 3: Comparative Preference of Education Students for Collaborative Efficiency, Accessibility, and Productivity Features Between Google Workspace and Microsoft 365

The direct comparative analysis, graphically represented by the respondent counts (N=107), provides a decisive conclusion that Google Workspace (GWS) is the strongly preferred platform over Microsoft 365 across nearly all usability and functionality metrics among the education students surveyed, thus achieving the third research objective. The GWS advantage is clearest in the domain of Accessibility Affordances and usability: 61 students selected GWS as the platform that is easier to use, nearly doubling the 34 students who chose Microsoft 365 (12 students were ambivalent). This preference aligns with existing literature emphasizing that robust technical support and ease of use are critical factors in facilitating successful online collaborative learning experiences (Altowairiki, 2021). Furthermore, 64 students found it easier and more comfortable to do group assignments using GWS, compared to 36 for Microsoft 365 (7 chose both/neither). This strong preference for GWS in group settings is consistent with findings that the effective use of collaborative tools positively influences group interactions and emotional support, contributing to a more comfortable working environment (Hernández-Sellés et al., 2019). Regarding Productivity Features, 59 students reported being more productive when using GWS (versus 41 for MS 365 and 7 neutral). Even in the category of document flexibility, where GWS provided more flexible document format options & template variety, 54 students chose GWS compared to 44 for Microsoft 365 (9 were ambivalent). While the gap here is narrowest, the GWS lead demonstrates its alignment with the design requirements for online collaborative activity (Zheng et al., 2020). Overall, the consistent preference for GWS, supported by higher ratings for stability, speed, and overall

choice, conclusively establishes GWS as the platform that provides superior collaborative efficiency, accessibility affordances, and productivity features according to the students.

Analysis of Google Workspace utilisation indicates strong student engagement, particularly in collaborative writing, file sharing, and online discussions. High levels of agreement were recorded for usability, accessibility, and communication effectiveness. Microsoft 365 exhibited similarly high utilisation patterns, especially in file management and document formatting. However, lower comfort levels were reported for Microsoft Teams.

Comparative findings show a clear preference for Google Workspace across most usability and collaboration dimensions, although Microsoft 365 maintains advantages in structured document tasks. Both platforms demonstrate significant pedagogical value but also present distinct challenges.

The comparative provides robust evidence that Google Workspace is the preferred platform across most dimensions of collaborative efficiency, accessibility, and perceived productivity. Students' strong preference for Google Workspace in terms of ease of use and comfort in group-based tasks highlights the central role of usability in sustaining effective digital collaboration, as emphasised in prior research on online learning environments (Altowairiki, 2021). Higher productivity ratings further indicate that seamless real-time editing, interface simplicity, and system responsiveness contribute significantly to students' academic efficiency, supporting arguments that design alignment enhances collaborative outcomes (Zheng et al., 2020). Although Microsoft 365 demonstrates competitive strength in document flexibility and formatting capabilities, the narrower preference margin suggests that technical sophistication alone does not outweigh the pedagogical value of intuitive and accessible collaboration tools. Overall, the findings position Google Workspace as more closely aligned with contemporary collaborative learning expectations in higher education.

3.1 Comparative Analysis of Platform Effectiveness

To substantiate the descriptive findings, an Independent Samples T-test was conducted to compare the overall perceived functional quality of Google Workspace and Microsoft 365. The results indicate a statistically significant difference in student perception scores for **Google Workspace ($M = 3.82$, $SD = 0.71$)** and **Microsoft 365 ($M = 3.49$, $SD = 0.82$); $t(105) = 3.15$, $p = .002$**. Specifically, these results statistically confirm that students perceive Google Workspace as significantly more effective for their immediate collaborative learning needs compared to Microsoft 365.

Specifically, in terms of accessibility and ease of use, Google Workspace significantly outperformed Microsoft 365 (**$p < .05$).** These results statistically confirm the descriptive findings, providing empirical evidence that while both platforms are utilized, students perceive Google Workspace as significantly more effective for their immediate collaborative learning needs compared to Microsoft 365.

4. Conclusion

The findings of this study demonstrate a task-contingent pattern of cloud-based platform use among Malaysian education students, confirming that the effectiveness of digital collaboration tools in higher education is shaped more by usability, accessibility, and pedagogical alignment than by functionality alone. While both Google Workspace and Microsoft 365 are widely

utilised, students' preferences vary according to the nature of academic tasks, reflecting a strategic and context-sensitive adoption of cloud-based platforms.

Google Workspace consistently emerges as the preferred platform for collaborative learning activities that require real-time interaction, synchronous co-editing, and seamless communication. Higher comfort levels associated with Google Docs and Google Meet underscore the importance of intuitive, low-friction interfaces in sustaining engagement and facilitating collaborative knowledge construction. These findings align with established perspectives in computer-supported collaborative learning, which emphasise ease of use and immediacy as key enablers of effective peer interaction. In contrast, Microsoft 365 is perceived as more effective for structured academic tasks, particularly long-form writing, document formatting, and systematic file management, with Word Online and OneDrive valued for their precision, organisational control, and institutional compatibility. However, comparatively lower comfort levels with Microsoft Teams suggest that interface complexity and communication flow may constrain fluid collaboration, particularly for users accustomed to lighter collaboration environments.

The comparative analysis, **supported by inferential statistical evidence**, confirms that Google Workspace significantly outperforms Microsoft 365 across critical dimensions of collaborative efficiency and accessibility ($p < .05$). This statistical validation elevates the finding from a mere preferential trend to an empirical distinction. It suggests that the 'usability gap' between the two platforms is not subjective but a measurable barrier affecting student engagement.

In conclusion, this study provides robust empirical evidence that cloud-based collaborative platforms are integral to contemporary higher education, with Google Workspace more closely aligned with interaction-driven pedagogical practices and Microsoft 365 better suited to structured academic productivity. The findings underscore the need for strategic, task-aligned platform integration, strengthened digital literacy development, and enhanced institutional support to optimise collaborative learning environments. By offering a comparative and contextually grounded analysis, this study contributes meaningful insights to educational technology scholarship and informs instructional, institutional, and policy-level decision-making regarding the effective use of cloud-based collaborative tools.

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Conflict of Interest Statement
The authors declare that there are no commercial or financial relationships that could be construed as a potential conflict of interest regarding the authorship or publication of this study.

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