Alqalam Journal of Medical and Applied Sciences. 2025;8(2):1235-1245
https://doi.org/10.54361/ajmas.2582105

Original article

An Interactive Comparison of WhatsApp, Telegram, and Google Classroom: Usability and User Experience Insights

Reem Alsunousi*, Mona Mohammed

Faculty of Science, Omar Al-Mukhtar University, Al Bayda, Libya
Corresponding Email. reem.abdalhadi@omu.edu.ly

Abstract
This study presents a comprehensive comparative analysis of the usability and user experience of three widely utilized applications: WhatsApp, Telegram, and Google Classroom. Grounded in the ISO 9241-11 framework and Human-Computer Interaction (HCI) principles, the research examines these applications across key dimensions, including efficiency, effectiveness, and user satisfaction. A quantitative descriptive methodology was adopted, involving a Likert-scale survey distributed among 71 participants, including faculty members, postgraduate students, and undergraduate students specializing in IT disciplines. The data collected were analyzed using SPSS through descriptive statistics, T-tests, ANOVA, and correlation analyses. The results reveal that WhatsApp leads in user satisfaction and daily usability due to its simplicity and adaptability to routine communication needs. Telegram is preferred for its superior privacy features and support for advanced functionalities, making it ideal for secure communication and academic purposes. Google Classroom, while excelling in educational effectiveness, faces usability challenges in real-time communication and adaptability. Additionally, user feedback highlights key areas for improvement, such as enhancing privacy in WhatsApp, improving file upload reliability in Telegram, and refining Google Classroom's interface for broader accessibility. This study provides valuable insights for application developers, educators, and researchers, emphasizing the need for tailoring applications to diverse user contexts and enhancing their usability to meet evolving demands.
Keywords. Instant Messaging, WhatsApp, Telegram, Google Classroom, Likert Scale Survey, Usability, HCI Principles, SPSS Analysis.

Introduction

In today's rapidly advancing digital era, mobile applications have become indispensable tools for communication, collaboration, and education. applications such as WhatsApp, Telegram, and Google Classroom have emerged as pivotal technologies catering to diverse user needs. WhatsApp and Telegram are widely known for their instant messaging capabilities, while Google Classroom is specifically designed for educational purposes, facilitating the organization and dissemination of learning resources. These applications have significantly reshaped how users interact in personal, professional, and academic settings [1,2]. The concept of usability, as defined by the ISO 9241-11 standard, focuses on efficiency, effectiveness, and satisfaction, three critical metrics that influence how users interact with digital systems [3]. Usability ensures that applications meet user expectations, enabling them to achieve their objectives with minimal effort and maximum satisfaction. Additionally, principles of Human Computer Interaction (HCI), such as error prevention, transparency, and adaptability, are essential in evaluating and enhancing user experience [4]. While previous studies have investigated the usability and user experience of WhatsApp, Telegram, and Google Classroom individually, comprehensive comparative analyses remain limited. WhatsApp is often lauded for its simplicity and intuitive interface, Telegram for its advanced privacy features and scalability, and Google Classroom for its structured approach to educational resource management [5-7]. However, a direct comparison of these applications across key usability dimensions such as efficiency, effectiveness, and satisfaction is necessary to provide actionable insights for developers, educators, and users. This study addresses this gap by conducting an in-depth usability evaluation, aiming to inform future improvements and foster a deeper understanding of these applications' strengths and limitations.

The remainder of this paper is structured as follows: Section 2 provides a comprehensive review of the literature. Section 3 describes the methodology, including the research design, sample selection, data collection, and analysis techniques. Section 4 presents the results and discussion and analyzes the data collected. Section 5 provides the conclusion, highlighting the main ideas, limitations of the study, and recommendations for future research.

WhatsApp has been extensively studied for its role as a leading communication application. Its usability is often attributed to its simplicity, reliability, and user-centered design. A study by [5] highlighted WhatsApp's ability to facilitate user engagement by providing efficient communication tools and intuitive navigation, making it essential for both personal and professional use. Similarly, in the paper [6], the authors demonstrated that WhatsApp's cross-application capabilities and robust performance enhance user satisfaction and trust. In educational settings, WhatsApp has proven effective in fostering collaboration and engagement among students and educators. [1] emphasized its ability to enhance student motivation by offering a convenient application for discussions and information sharing. However, challenges such as managing fast-paced group chats and limited customization options remain areas for improvement [7].

Received*: 21-04-2025 -* ***Accepted****: 20-06-2025 -* ***Published****: 30-06-2025*

Telegram is recognized for its advanced features, such as cloud-based messaging, support for large groups, and integration with bots. Research by [8] emphasized Telegram's scalability and privacy features, which make it suitable for both personal and academic use. The authors of the study [9] reported significant improvements in user satisfaction after addressing usability feedback, with Telegram achieving a usability score of 92%. Despite its strengths, heuristic evaluations reveal areas for improvement. In the paper [10], the authors noted that Telegram's minimalist design could benefit from enhanced visual elements and greater consistency. The authors of the study [11] highlighted Telegram's effectiveness in knowledge sharing, particularly in collaborative environments, but also emphasized the need for technical stability. A recent comparative study by [12] utilized heuristic principles to evaluate the usability of WhatsApp and Telegram. The study found that while WhatsApp excelled in ease of use, Telegram outperformed in privacy and advanced functionalities, aligning with the preferences of users who prioritize security and scalability. Furthermore, the researchers of the paper [13] explored user experience design in messenger services, emphasizing Telegram's advanced features and WhatsApp's simplicity, offering valuable insights into their respective user engagement strategies. Google Classroom serves as a prominent tool for managing educational activities, particularly in remote learning contexts. Studies by [7] found that over 80% of users rated Google Classroom as effective and efficient for managing assignments and accessing learning materials. Its straightforward interface contributes to high satisfaction rates among users. However, challenges persist. In a previous study [14], the authors identified significant usability gaps for younger users, with lower satisfaction scores compared to college students. In a study by [15], the authors highlighted issues related to system feedback and inactive controls, suggesting the need for interface enhancements to better meet diverse user needs. When compared, WhatsApp excels in ease of use and overall user satisfaction, while Telegram stands out for its privacy features and scalability. Google Classroom, on the other hand, demonstrates high effectiveness in educational contexts but faces challenges in adaptability and real-time communication. These findings align with studies by [16], which emphasize the importance of tailoring application designs to specific user needs and contexts.

Methods

Study design

A descriptive quantitative design was utilized to collect and analyze data, focusing on describing and comparing the usability and user experience of the applications used. The study adhered to the International Organization for Standardization (ISO) usability standards, particularly ISO 9241-11, which emphasize effectiveness, efficiency, and satisfaction in specific contexts of use. The principles of HCI guided the design and evaluation framework.

Study sample

The study targeted a purposive sample of participants with relevant technical backgrounds to ensure familiarity with the applications under investigation. This sample included university students majoring in computer science or information technology, as well as graduate students and faculty members from disciplines related to information technology. A total of 71 responses were collected from participants across various academic and professional levels. This demographic was chosen to ensure that participants had adequate exposure to WhatsApp, Telegram, and Google Classroom, allowing for informed and accurate assessments.

Sampling Method

Convenience sampling was used, allowing available and willing participants to participate during the data collection period.

Data Collection

Data were collected through an online survey distributed electronically over two weeks. The instrument was designed using a 5-point Likert scale, with response options ranging from "Strongly Disagree" (1) to "Strongly Agree" (5), to effectively capture participants' perceptions. The survey addressed three key areas: demographic information (such as participants' roles, e.g., student or faculty member, age, and gender); usability factors assessing efficiency, effectiveness, and satisfaction with each application; and comparative analysis questions aimed at evaluating and contrasting the usability and user experience across the three selected applications.

Usability Evaluation Framework

The usability of the applications was assessed based on internationally recognized standards encompassing three core dimensions. Effectiveness was evaluated by measuring the extent to which users could complete their tasks using each application accurately and without errors. Efficiency focused on the time and effort required to accomplish those tasks, reflecting how quickly and resourcefully users could achieve their goals.

Received*: 21-04-2025 -* ***Accepted****: 20-06-2025 -* ***Published****: 30-06-2025*

Satisfaction captured the overall user experience, emphasizing participants' enjoyment, comfort, and ease of use while interacting with the applications.

Data Analysis

The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS) to ensure rigorous statistical analysis. Frequencies, percentages, means, and standard deviations were calculated to summarize participants' responses and provide an overview of the dataset. A one-sample T-Test was used to determine the level of differences in efficiency, effectiveness, and user satisfaction of applications by comparing observed averages to a hypothetical standard. An Independent Sample T-Test was used to examine differences in usability and user experience according to demographic variables.

Analysis of Variance (ANOVA) was performed to assess differences in usability and user experience within demographic groups, such as age and occupation, and a Pearson correlation was used to explore relationships between applications and understand how user preferences relate to usability metrics. The results are presented clearly and concisely using a tabular presentation.

Ethical Considerations

The study ensured participant anonymity and confidentiality. Informed consent was obtained from all participants before completing the survey, and the collected data ware used solely for academic research purposes. This methodology provides a structured approach to comprehensively evaluate the usability and user experience of WhatsApp, Telegram, and Google Classroom, contributing valuable insights into the effectiveness of these applications in various academic and professional contexts.

Results and Discussion

This section presents the findings of the study, beginning with an analysis of the demographic characteristics of the study sample, followed by the results of the usability and user experience evaluations for WhatsApp, Telegram, and Google Classroom. Key insights are discussed in relation to the study's objectives, highlighting differences and similarities among the applications across metrics such as efficiency, effectiveness, and user satisfaction. Demographic characteristics of the study sample: The demographic variables of the studied sample were described in terms of frequencies and proportions as in Table 1.

Table 1. Demographic Characteristics of the Study Sample

Variable	Category	Frequency	Percentage (%)
Gender	Male	30	42.3
	Female	41	57.7
Age Group	18 – 25	7	9.9
	26 – 35	11	15.5
	36 – 45	42	59.2
	Above 45	11	15.5
Occupation	Faculty Member	42	59.2
	Postgraduate Student	21	29.6
	Undergraduate Student	8	11.3
Daily Usage (hours)	Less than 1 hour	12	16.9
	1 – 3 hours	22	31.0
	3 – 5 hours	25	35.2
	More than 5 hours	12	16.9

Table 1 shows that female respondents (57.7%) outnumbered males (42.3%) by 15.4%, indicating greater engagement by women in online surveys or digital tools. Most participants were aged 36–45 (59.2%), reflecting strong involvement from mid-career individuals balancing academic and professional roles, while other age groups contributed roughly 15% each. Faculty members made up the majority (59.2%), highlighting the focus on academic users, followed by graduate students (29.6%) and undergraduates (11.3%). Additionally, most participants used the applications for 3–5 hours daily (35.2%), demonstrating significant interaction, particularly in academic and professional contexts.

The first hypothesis posits that there are statistically significant differences at the significance level of $\alpha = 0.01$ in efficiency, effectiveness, and user satisfaction across the three applications. A one sample t-test was

Received*: 21-04-2025 -* ***Accepted****: 20-06-2025 -* ***Published****: 30-06-2025*

conducted, comparing the hypothetical mean score (27) with the calculated mean scores for each application, as presented in Table 2.

Table 2. Differences in the Three Applications Compared to the Hypothetical Mean (27)

Application	Mean Score	Standard Deviation	t-value	Degrees of Freedom	P_value
WhatsApp	34.35	3.72	16.68	70	0.000
Telegram	32.39	4.81	9.45	70	0.000
Google Classroom	31.18	4.82	7.32	70	0.000

The results indicate that the applications significantly exceeded the hypothetical mean of 27, with statistical significance at $p < 0.01$. WhatsApp achieved the highest scores (Mean = 34.35, t = 16.68), reflecting strong user satisfaction and efficiency, particularly in communication. Telegram (Mean = 32.39, t = 9.45) performed well but slightly below WhatsApp, emphasizing its focus on privacy and advanced features. Google Classroom (Mean = 31.18, t = 7.32) recorded the lowest scores, suggesting it is effective but less satisfying, likely due to its primary focus on education rather than general communication. These findings confirm the alternative hypothesis, highlighting significant differences in user opinions and supporting the study's proposed hypothesis.

To test the second hypothesis, which states that there are statistically significant differences in the usability, effectiveness, and user satisfaction of the three applications based on demographic variables (gender, age, profession, and usage hours), an Independent Samples t-test was conducted. The gender variable was examined by comparing the mean scores of male and female participants for each application, as shown in Table 3.

Table 3. Differences in Applications by Gender

Application	Gender	Count	Mean	Standard Deviation	t-value	Degrees of Freedom	Significance (p-value)
Telegram	Male	30	31.55	4.91	2.27	69	0.019
	Female	41	34.27	4.08			
Google Classroom	Male	30	32.04	4.61	2.31	69	0.024
	Female	41	29.27	4.81			
WhatsApp	Male	30	34.61	3.88	0.88	69	0.382
	Female	41	33.77	3.87			
All Applications	Male	30	5.79	1.24	6.23	69	0.000
	Female	41	7.77	1.23			

The results indicate significant gender differences for Telegram ($p = 0.019$) and Google Classroom ($p = 0.024$), while WhatsApp ($p = 0.382$) showed no significant variation. Overall, females reported higher satisfaction and effectiveness across all applications ($p = 0.000$). Specifically, Telegram received higher ratings from females, likely due to its features aligning with their communication preferences. In contrast, Google Classroom was rated higher by males, possibly reflecting differences in academic roles or usage patterns. Meanwhile, WhatsApp showed no notable gender-based differences, reinforcing its universal appeal across diverse users. These findings suggest that gender-specific preferences influence usability and engagement, with females demonstrating greater overall satisfaction and effectiveness in digital tool adoption.

To analyze age-related differences in the use of applications, a one-way ANOVA test was conducted. The test assessed differences in the mean scores across age groups for the applications. Table 4 summarizes the results.

Table 4 shows that the hypothesis was partially achieved in some applications and not achieved in others, as we notice a statistical significance of (0.01) on the Telegram application, where the differences in the averages were in favor of the age group (26-35) with an average of (36.18) compared to the rest of the other categories, while we find that the averages on the other two applications were close, which led to no differences between them. The lowest scores were observed for users over the age of 45 (30.09), indicating a decrease in usability or engagement among older users. Thus, the analysis shows that Telegram stands out for the age group 26-35 years, indicating a targeted appeal for this age group. In contrast, Google Classroom and WhatsApp show consistent usability across all age groups, confirming broader accessibility and adaptability.

Received*: 21-04-2025 -* ***Accepted****: 20-06-2025 -* ***Published****: 30-06-2025*

These insights highlight the importance of designing an app according to the needs of specific user demographics.

The differences in application performance across professions were analyzed using the One-way ANOVA test. This aims at identifying statistically significant differences in performance means based on professional categories. The results are shown in Table 5 below.

Table 4. One-Way ANOVA Analysis for Age-Related Differences Across Applications

Application	Age Group	Count	Mean Score	Standard Deviation	Source of variation	Sum of Squares	Degrees of Freedom	Mean Square	F_value	P_value
Telegram	18–25	7	34.00	3.103	**Between Groups**	252.293	3	84.098	4.117	0.010
	26–35	11	36.18	5.055						
	36–45	42	31.71	4.768	**Within Groups**	1368.665	67	20.428		
	>45	11	30.09	3.504						
	Total	71	32.34	4.812	**Total**	1620.958	70			
Google Classroom	18–25	7	30.27	3.632	**Between Groups**	29.912	3	9.971	0.419	0.740
	26–35	11	31.18	4.752						
	36–45	42	31.69	5.068	**Within Groups**	1594.708	67	23.802		
	>45	11	30.00	4.858						
	Total	71	3.11	4.616	**Total**	1624.620	70			
WhatsApp	18–25	7	35.19	3.537	**Between Groups**	59.178	3	19.726	1.457	0.234
	26–35	11	36.27	3.958						
	36–45	42	33.77	3.857	**Within Groups**	907.019	67	13.538		
	>45	11	34.09	2.588						
	Total	71	34.31	3.715	**Total**	966.197	70			

Table 5. One-way ANOVA for differences in applications according to the profession variable.

Performance	Profession	Count	Mean	Standard Deviation	Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F-Value	P_value
Telegram	Faculty Member	42	31.26	4.537	Between Groups	132.386	2	66.193	3.024	0.05
	Graduate Student	21	33.95	5.398	Within Groups	1488.571	68	21.891		
	Undergraduate Student	8	34.25	2.964						
	Total	71	32.39	4.812	Total	1620.958	70			
Classroom	Faculty Member	42	31.38	4.813	Between Groups	10.602	2	5.301	0.223	0.80
	Graduate Student	21	31.19	5.400	Within Groups	1614.018	68	23.736		
	Undergraduate Student	8	30.12	3.399						
	Total	71	31.18	4.817	Total	1624.620	70			
WhatsApp	Faculty Member	42	33.97	3.738	Between Groups	22.578	2	11.289	0.814	0.44
	Graduate Student	21	34.57	3.709	Within Groups	943.619	68	13.877		
	Undergraduate Student	8	35.75	3.693						
	Total	71	34.35	3.715	Total	966.197	70			

Received*: 21-04-2025 -* ***Accepted****: 20-06-2025 -* ***Published****: 30-06-2025*

It is clear from Table 5 that the hypothesis was partially confirmed in some applications and not in others. For the Telegram application, there was a statistically significant difference (p = 0.05) among professions, with undergraduate students achieving the highest mean performance (34.25), outperforming the other groups. The significant difference in Telegram's performance suggests that undergraduate students are more familiar with this application, possibly due to frequent use for personal or academic purposes. The lack of differences in Classroom and WhatsApp indicates that these applications cater equally well to all professional groups, highlighting their general usability. This implies that tailoring application features to specific user groups may enhance performance for certain applications. To assess the impact of usage hours on the effectiveness of applications, a one-way ANOVA test was conducted. The test examined differences in mean scores across four categories of usage hours (<1 hour, 1–3 hours, 3–5 hours, and >5 hours) for Telegram, Google Classroom, and WhatsApp. Table 6 presents the findings.

Table 6. One-Way ANOVA Analysis for Differences Across Usage Hours

Application	Usage Hours	Count	Mean Score	Standard Deviation	Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F_value	P_value
Telegram	<1 hour	12	32.50	3.397	Between Groups	9.913	3	3.304	0.137	0.94
	1–3 hours	22	32.09	4.081	Within Groups	1611.045	67	24.045		
	3–5 hours	25	32.24	5.293						
	>5 hours	12	33.16	6.478						
	Total	71	32.39	4.812	Total	1620.958	70			
Google Classroom	<1 hour	12	30.91	3.449	Between Groups	93.402	3	31.134	1.36	0.26
	1–3 hours	22	32.63	5.178	Within Groups	1531.218	67	22.854		
	3–5 hours	25	30.96	5.255						
	>5 hours	12	29.25	3.980						
	Total	71	31.18	4.817	Total	1624.620	70			
WhatsApp	<1 hour	12	33.50	3.316	Between Groups	62.664	3	20.888	1.549	0.21
	1–3 hours	22	33.31	3.708	Within Groups	903.533	67	13.486		
	3–5 hours	25	35.36	4.040						
	>5 hours	12	35.00	3.045						
	Total	71	34.35	3.715	Total	966.197	70			

The analysis revealed no significant differences in mean scores based on usage hours for Telegram (p = 0.94), Google Classroom (p = 0.26), and WhatsApp (p = 0.21). For Telegram, mean scores were consistent, with the highest score (33.16) for users spending more than 5 hours. In Google Classroom, users with 1–3 hours reported the highest mean (32.63), but differences across categories were minor. For WhatsApp, the highest mean (35.36) was observed among users with 3–5 hours, yet variations were minimal. These findings suggest that usage hours do not significantly influence the effectiveness or user experience across these applications.

Frequency Distributions of Open-Ended Questions**:** The frequency distributions were calculated based on counts and percentages, as shown in Table 7. These distributions help in understanding the common difficulties faced by users when utilizing WhatsApp.

Table 7. Frequency Distribution of Challenges Faced While Using WhatsApp

Difficulty	Frequency	Percent (%)
Large files and videos	8	11.3
Slow loading	1	1.4
Weak internet connection	4	5.6
Using the same number on two devices	2	2.8
No difficulties	56	78.9

Received*: 21-04-2025 -* ***Accepted****: 20-06-2025 -* ***Published****: 30-06-2025*

The results indicate that most participants (78.9%, n=56) reported no difficulties in using WhatsApp. This aligns with previous findings that users generally find WhatsApp to be an effective and user-friendly application. Among the challenges mentioned, dealing with large files and videos (11.3%, n=8) were the most frequent, followed by weak internet connectivity (5.6%, n=4). Issues like slow loading (1.4%, n=1) and using the same number on multiple devices (2.8%, n=2) were relatively rare. These findings suggest that while some technical challenges exist, they are not widespread and do not significantly affect most users.
Frequency Distribution for Perceived Delays in WhatsApp Usage: To evaluate the challenges related to delays or slowness experienced during WhatsApp usage, the frequency and percentages of responses were calculated, as shown in Table 8.

Table 8. Frequency Distribution of Aspects Causing Delays in WhatsApp Usage

Aspect	Frequency	Percent (%)
Managing Groups	4	5.6
Poor Internet Connection	4	5.6
Sending Large Files	4	5.6
File Sharing	2	2.8
Video Uploading	4	5.6
No Issues	53	74.7

The results in Table (8) reveal that most of the participants (74.7%) reported no significant delays or slowness during WhatsApp usage. This high percentage suggests that most users did not face noticeable performance issues. These findings indicate that while delays in specific aspects of WhatsApp usage are present for some users, they are not widespread or dominant concerns. The data support the conclusion that WhatsApp generally performs efficiently for most users.
Frequency Distribution of Reasons for Dissatisfaction or Stress While Using WhatsApp: To explore the factors contributing to dissatisfaction or stress during WhatsApp usage, participants' responses were analyzed for frequency and percentages. Table (9) presents the results.

Table 9. Frequency Distribution of Reasons for Dissatisfaction While Using WhatsApp

Reason	Frequency	Percent (%)
Lack of Privacy	3	4.23
Unexpected Updates	1	1.40
Limited Features for Educational Use	3	4.23
"Offline" Status Despite Being Online	5	7.04
Excessive Notifications	3	4.23
Poor Time Management	3	4.23
No Issues	53	74.64

Table 9 shows that most participants (74.7%) reported no specific reasons for dissatisfaction or stress while using WhatsApp, indicating that most users find the application stress-free and satisfactory. Among the minority who reported issues, the most notable concern was annoyance with the "offline" status feature (7.0%), followed by lack of privacy, limited educational features, excessive notifications, and poor time management (each 4.2%). Unexpected updates were mentioned by only 1.4%. Overall, dissatisfaction among users is rare, with reported concerns being minor and scattered, reflecting a generally positive user experience. Difficulties Faced While Using Telegram: To assess the challenges users may encounter when using Telegram, a frequency distribution analysis was conducted. The responses were measured based on the frequency and percentage of participants reporting each difficulty, as presented in Table 10.

Table 10. Frequency Distribution of Difficulties Faced While Using Telegram

Difficulty	Frequency	Percent (%)
Accessing channels	3	4.23
Sharing files	3	4.23
Disturbance from excessive notifications	4	5.63
Unavailability of files in offline mode	5	7.04
Incomplete download of large files when exiting	4	5.63
Complex user interface	2	2.82
No difficulties	50	70.42

Received*: 21-04-2025 -* ***Accepted****: 20-06-2025 -* ***Published****: 30-06-2025*

Table 10 reveals that many participants (69.6%) reported no significant difficulties when using Telegram, suggesting a largely smooth user experience. Among the few users who reported challenges, the most common issues included the unavailability of files in offline mode (7.0%), followed by excessive notifications (5.6%) and incomplete downloads of large files when exiting (5.6%). Other difficulties, such as accessing channels, sharing files, and navigating a complex user interface, were reported by a smaller proportion (2.8%–4.2%). These findings indicate that while Telegram is generally user-friendly, minor usability issues are experienced by a small subset of users. The results align with responses to previous questions, further confirming Telegram's overall reliability and ease of use.

Frequency Distribution for Perceived Delays in Telegram Usage: To evaluate areas where users might experience delays or slowdowns while using Telegram, a frequency distribution analysis was conducted. Participants' responses were categorized and quantified based on the reported issues, as outlined in Table 11.

Table 11: Frequency Distribution of Delays Experienced in Telegram

Issue	Frequency	Percent (%)
Slow media loading	14	19.7
Search functionality issues	4	5.6
Slow bot operation	1	1.4
No delays or slowdowns	52	73.3

The table demonstrates that a significant majority of users (73.3%) did not experience any noticeable delays or slowdowns while using Telegram. Among the minority who reported issues, the most common challenge was slow media loading (19.7%), followed by problems with search functionality (5.6%) and slow bot operations (1.4%). These results suggest that Telegram generally provides smooth and efficient user experience for most participants. The identified issues, while notable for a small subset of users, do not appear to detract significantly from the application's overall usability. This aligns with Telegram's reputation for reliability, with only isolated instances of performance-related challenges.

Dissatisfaction or Stress While Using Telegram: To explore potential reasons for dissatisfaction or stress during the use of Telegram, a frequency analysis was performed. Participants' responses were categorized and summarized in Table 12.

Table 12. Frequency Distribution of Dissatisfaction Causes in Telegram

Reason	Frequency	Percent (%)
Lack of flexibility	2	2.82
Overwhelming notifications	2	2.82
Difficulty finding items easily	1	1.41
Satisfaction reported	5	7.04
No dissatisfaction or stress	61	85.91

The results in Table 12 reveal that a vast majority of participants (85.9%) reported no dissatisfaction or stress while using Telegram. Among the minority who expressed concerns, the reasons included lack of flexibility (2.8%), overwhelming notifications (2.8%), and difficulty in finding items easily (1.4%). Interestingly, a small proportion (7.0%) explicitly expressed satisfaction with Telegram. These findings highlight Telegram's ability to provide a largely stress-free and satisfactory experience for most users. The minimal reports of dissatisfaction point to isolated issues that may not significantly impact on the overall user experience. This reinforces Telegram's reputation as a reliable and user-friendly application.

Difficulties Faced While Using Google Classroom: To assess the Difficulties encountered by users while utilizing Google Classroom, a frequency analysis was conducted. Participants' responses were categorized, and the results are summarized in Table 13.

Table 13. Frequency Distribution of Difficulties Faced While Using Google Classroom

Difficulties	Frequency	Percent (%)
Difficulty with interface design	3	4.23
Uploading course materials	4	5.63
Trouble tracking tasks	4	5.63
Switching between accounts	3	4.23
No challenges reported	57	80.28

The results in Table (13) show that most participants (80.3%) reported no challenges while using Google Classroom. This aligns with previous findings indicating a generally positive user experience with the application. Among the minority who did report challenges, the most common issues included difficulties

Received*: 21-04-2025 -* ***Accepted****: 20-06-2025 -* ***Published****: 30-06-2025*

with uploading course materials (5.6%) and tracking tasks (5.6%). Additional concerns such as interface adjustments and switching between accounts, were reported by smaller proportions of users (4.2% each). These findings suggest that Google Classroom is well-regarded for its ease of use, with only a small percentage of users facing minor challenges. Addressing these isolated concerns could further enhance the application's usability and user satisfaction. Delays Experienced While Using Google Classroom: This section evaluates whether participants experienced delays or slowness while using Google Classroom. The frequency distribution of responses is summarized in Table 14.

Table 14. Frequency Distribution of Delays Experienced While Using Google Classroom

Aspect of Delay	Frequency	Percent (%)
Uploading assignments	6	8.45
Searching for tasks	5	7.04
Viewing content on Google Drive	3	4.23
No delays reported	57	80.28

The results in Table 14 demonstrate that a significant majority of participants (80.2%) reported no delays while using Google Classroom. This indicates that the application is generally perceived as responsive and efficient. Among the minority who did report delays, the most cited issues included challenges with uploading assignments (8.5%) and searching for tasks (7.0%). A smaller percentage of users (4.2%) mentioned delays when viewing content hosted on Google Drive. These findings highlight that Google Classroom provides a seamless experience for most users, with only a few experiencing minor inefficiencies in specific areas. Addressing these isolated delays could further improve the application's overall usability and effectiveness. Dissatisfaction or Stress While Using Google Classroom: This section explores participants' feelings of dissatisfaction or stress while using Google Classroom. The frequency distribution of responses is presented in Table 15.

Table 15. Frequency Distribution of Dissatisfaction While Using Google Classroom

Reason	Frequency	Percent (%)
Failure to send submissions	2	2.8
Lack of flexibility	6	8.5
Issues with file sharing	4	5.6
No dissatisfaction or stress	59	83.1

The results in Table 15 reveal that most participants (83.1%) reported no dissatisfaction or stress while using Google Classroom, reflecting a positive user experience with the application.
Among the small percentage of respondents who did report dissatisfaction, the primary reasons included a lack of flexibility (8.5%) and difficulties with file sharing (5.6%). A smaller number of participants (2.8%) cited issues related to sending submissions. These findings suggest that Google Classroom is largely effective and satisfactory for most users, with minimal concerns. Addressing the minor issues raised could further enhance user satisfaction and overall experience.
Reasons for Preferring a Specific Application Over Others: This section investigates the primary reasons participants favor one application over the others. Table 16 summarizes the frequency distribution of responses regarding their preferred application and the justification for their preference.

Table 16. Reasons for Preferring a Specific Application Over Others

Reason for Preference	Frequency	Percent (%)
Google Classroom for secure handling	3	4.2
Telegram for personal and academic purposes	13	18.3
WhatsApp for flexibility and daily use	35	49.3
Google Classroom for its educational value	2	2.8
Telegram for task completion and easy file sharing	7	9.9
Telegram for security and privacy	11	15.5

WhatsApp emerged as the most preferred application, with 49.3% of participants favoring it for its flexibility and daily usability, underscoring its ease of integration into users' routines. Telegram followed, valued for its security and privacy (15.5%) and suitability for personal and academic purposes (18.3%), appealing to users prioritizing confidentiality and advanced features. Google Classroom, though less favored, was noted by 4.2% for secure material handling and 2.8% for its effectiveness in education. These results reflect how user preferences align with each application's strengths: WhatsApp for daily use, Telegram for privacy, and Google Classroom for structured learning.

Received*: 21-04-2025 -* ***Accepted****: 20-06-2025 -* ***Published****: 30-06-2025*

Table 17. Suggestions for Improving the Applications

Suggestion	Frequency	Percent (%)
Improve the Google Classroom interface	10	14.08
Enhance search functionality and tools	8	11.27
Increase privacy and security in WhatsApp	15	21.13
Extend update intervals	7	9.86
Enable device synchronization in WhatsApp	6	8.45
Simplify large file uploads in WhatsApp	10	14.08
Support group video calls in Telegram	7	9.86
Improve Telegram's environment to prevent file upload interruptions	8	11.27

The most frequently suggested improvement, cited by 21.1% of participants, is enhancing privacy and security in WhatsApp, reflecting concerns about data protection. Other significant suggestions include improving Google Classroom's interface (14.1%) for better usability, simplifying large file uploads in WhatsApp (14.1%), and enhancing Telegram's file upload reliability and search functionality (11.3%). Additionally, participants suggested supporting group video calls in Telegram (9.9%) to expand its collaborative features. These priorities highlight the importance of security, technical stability, and user-friendly designs in improving user satisfaction across the used applications. Pearson correlation coefficients were used to investigate the association among the three uses. Based on user preferences and usage behavior, this analysis aids in gauging the strength and relevance of links among WhatsApp, Telegram, and Google Classroom. Table 18 below shows the results.

Table 18. Pearson Correlation Coefficients Between Applications

Pearson Correlation		Telegram	Google Classroom	WhatsApp
Telegram	**Pearson Correlation**	1	0.145	**0.408****
	Sig. (2-tailed)		0.228	.000
	N	71	71	71
Google Classroom	**Pearson Correlation**	0.145	1	.008
	Sig. (2-tailed)	0.228		.950
	N	71	71	71
WhatsApp	**Pearson Correlation**	**0.408** **	0.008	1
	Sig. (2-tailed)	0.000	0.950	
	N	71	71	71

*Note: ** Correlation is significant at the 0.01 level (2-tailed).*

Table 18 presents Pearson correlation coefficients measuring the relationships between the three applications: Telegram, Google Classroom, and WhatsApp. The findings indicate a significant positive correlation. Between WhatsApp and Telegram ($r = 0.408$, $p = 0.000$), this indicates a statistically significant relationship between these two applications, suggesting that users who find one of these applications usable and effective tend to have a similar perception of the other. This could be attributed to their overlapping functionalities, such as instant messaging and media sharing, which cater to users with similar communication needs. The data further shows no strong link between Google Classroom and other apps since the link between Google Classroom and Telegram ($r = 0.145$, $p = 0.228$) is not statistically significant. This implies that since Telegram is more of a general communication tool and Google Classroom is concentrating on orderly academic interactions, user experiences with Telegram do not strongly forecast their view of Google Classroom. Likewise, not statistically significant is the link between Google Classroom and WhatsApp ($r = 0.008$, $p = 0.950$). This emphasizes that in usability and user preference, Google Classroom works independently of WhatsApp, therefore underlining the idea that its use in academic settings varies markedly from the informal and social character of WhatsApp.

The greater connection between Telegram and WhatsApp indicates that both apps are similarly popular among consumers, as such. Improvements in how one application is used could help to change the perception of the other one. Google Classroom's lack of correlation underlines its function in educational environments. Improvement of its design and performance must be treated independently from the typical messaging services. These observations can assist software engineers to fine-tune applications depending on consumer requirements, therefore guaranteeing better linkage where needed and preserving unique qualities for every app.

Received*: 21-04-2025 -* ***Accepted****: 20-06-2025 -* ***Published****: 30-06-2025*

Conclusion

This study conducted a comparative usability and user experience analysis of WhatsApp, Telegram, and Google Classroom, focusing on efficiency, effectiveness, and user satisfaction. The findings revealed significant differences in how users perceive and interact with these applications, reflecting their distinct strengths and limitations. WhatsApp emerged as the most preferred application, favored for its flexibility and daily usability. Its high scores in user satisfaction and usability metrics highlight its seamless integration into personal and professional communication needs. Telegram, on the other hand, excels in security and privacy features, making it a top choice for users prioritizing confidentiality and advanced functionalities like file sharing. Google Classroom, while more niche in its appeal, demonstrated high effectiveness in structured educational contexts, though it faced challenges in adaptability and usability for broader applications. The study also highlighted areas for improvement across the three applications. Users expressed a need for enhanced privacy and security in WhatsApp, improved interfaces and usability in Google Classroom, and greater technical reliability and collaborative features in Telegram. Addressing these gaps would likely lead to improved user satisfaction and expanded adoption across various contexts.

Limitations and Future Work

The study's findings are based on a sample of participants from specific demographics, primarily those with a background in information technology. Future studies should include more diverse user groups to generalize findings. Moreover, the reliance on self-reported data through surveys might introduce biases. Future research could incorporate usability testing or real-world behavioral data to validate and expand upon these results. In conclusion, this study bridges an important gap in comparative usability research, providing valuable insights for developers and stakeholders. It highlights the strengths and weaknesses of WhatsApp, Telegram, and Google Classroom, laying the groundwork for further improvements and inspiring future research in the field of usability and user experience.

Conflict of interest. Nil

References

1. Mistar M, Embi MA. Students' perception on the use of WhatsApp as a learning tool in ESL classroom. J Educ Soc Sci. 2020;13(1):14-20.
2. Iftakhar J. Google Classroom: What works and how? J Educ Soc Sci. 2016;3:12-8.
3. International Organization for Standardization. ISO 9241-11:2018. Ergonomics of human-system interaction – Usability: Definitions and concepts. Geneva: ISO; 2018.
4. Preece J, Rogers Y, Sharp H. Interaction design: Beyond human-computer interaction. 4th ed. New York: John Wiley & Sons; 2015.
5. Siddiqui MA, Agarwal K. Analyzing WhatsApp chat data for user interaction and sentiment: A comprehensive approach. Int J Multidiscip Res. 2024;12(6):34-45.
6. Pradana R, Alfarisyi H. Evaluasi kinerja dan keamanan aplikasi WhatsApp terhadap kepercayaan konsumen metode usability testing [Performance and security evaluation of WhatsApp application on consumer trust using usability testing method]. J-ENSITEC. 2024;14(2):89-102.
7. Rizkiani NA, Iriani T, Mutinugraha RE. Analyzing the usability of Google Classroom as a remote learning platform. J Pendidik Teknol Inf. 2022;6(1):44-55.
8. Alrasheedi S, Capretz LF. The effects of WhatsApp and Telegram on student engagement: An analysis from the mixed-methods approach. Educ Inf Technol. 2022;27(3):1-22.
9. Sirken JP, Sulaksono AG. Evaluasi dan rekomendasi usability aplikasi chatting Telegram [Evaluation and usability recommendations for Telegram chat application]. JUTIM. 2024;5(2):56-70.
10. Rumini R, Astrid AI. Evaluating the usability of heuristics within Telegram. JURIKOM. 2019;11(3):112-20.
11. Fitriani R, Utamajaya JN. Penerapan metode PIECES sebagai evaluasi tingkat kepuasan pengguna aplikasi Telegram sebagai media knowledge sharing [Application of the PIECES method to evaluate user satisfaction with Telegram as a knowledge-sharing medium]. JURIKOM. 2022;11(3):44-55.
12. Seelam NP, Palisetti VSSK. Comparative research of WhatsApp and Telegram by using heuristic principles [Master's thesis]. Karlskrona, Sweden: Blekinge Institute of Technology; 2021.
13. Kim J, Lee Y, Park H. A study on comparing user experience design for messenger services focused on WhatsApp and Telegram. Int J Adv Comput Sci Appl. 2023;13(4):90-102.
14. Fauziah I, Nurwulan NR. Usability evaluation of Google Classroom for elementary school students. J Educ Technol. 2021;8(3):123-35.
15. Iryanti E, Kusumawardani SS, Hidayah I. Measuring Google Classroom's usability level from an expert perspective. J Teknol Pendidik. 2022;9(4):65-78.
16. Septiani E, Herliani H, Rambitan VMM. Effectiveness of Google Classroom and WhatsApp in remote learning during the COVID-19 pandemic. J Pendidik Pembelajaran. 2024;14(2):89-102.

Received*: 21-04-2025 -* ***Accepted****: 20-06-2025 -* ***Published****: 30-06-2025*