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EVALUATING GOOGLE CLASSROOM USABILITY DIMENSIONS AND FACULTY EXPERIENCE AT THE UNIVERSITY OF FALLUJAH: AN EMPIRICAL STUDY BASED ON NIELSEN'S USABILITY FRAMEWORK

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ABSTRACT

This study assesses the ease of use of Google Classroom from the perspective of faculty members at the University of Fallujah in the Republic of Iraq and identifies the most prominent technical and contextual problems that may affect faculty members' e-learning. The study used a quantitative approach. The study evaluated user experience dimensions using a structured questionnaire completed by 85 faculty members with master's and doctoral degrees. The evaluation used Nielsen's Usability Framework to assess ease of learning, efficiency, recall, security, and overall satisfaction in a learning environment with limited technological resources. The findings revealed that the Google Classroom platform is highly usable and that the interface is well understood (average usability score: 4.16; interface clarity: 4.21), which minimises the learning curve and helps manage the tasks necessary for learning. The study showed that there were, however, major contextual challenges, particularly about internet quality and speed (average score 4.12), but also regarding interface and performance features of the platform, which needed to be more flexible to overcome errors and to satisfy the needs of more advanced teaching, like detailed assessment tools. Academic qualifications also did not significantly affect usability ratings, as shown by the independent-samples t-test ($p = 0.945$). This study provides empirical evidence of how structural challenges affect real-world usability evaluations and the need to develop local interactive platform tools and support offline use to optimise platform effectiveness in higher education.

Keywords: E-learning, Usability, Google Classroom, Educational Institutions.

INTRODUCTION

Digitalisation has advanced rapidly in education, changing how teaching and learning are done and making e-learning platforms key tools for enhancing educational quality and access to learning resources across institutional settings. During the COVID-19 pandemic, a global crisis accelerated digital transformation in education, as school closures affected more than 90% of students worldwide (UNESCO, 2020). This shift has highlighted major issues with internet access, device availability, and teacher readiness to deliver lessons remotely in Iraq and other resource-limited settings, making systematic assessment of e-learning platform usability even more important. These platforms are now seen as more than add-on features; they are part of modern education systems that support flexible, learner-centred, and technologically enriched teaching and learning. Among popular platforms, Google Classroom is a strong choice for its user-friendly interface, cloud-based design, and integration with the Google suite of applications, which allows efficient management of virtual classrooms, teaching resources, and the evaluation and tracking of students' progress (Iftakhar, 2016). Research shows that Google Classroom can be pedagogically beneficial by supporting continuity of learning, collaboration, and interaction, especially in distance and blended learning environments.

Al-Marroof and Al-Emran (2018) highlighted that the platform creates an interactive digital environment that promotes communication between instructors and learners and facilitates collaborative knowledge building. Beyond facilitating the learning process, e-learning platforms also positively affect the development of higher-order cognitive skills. Sustained use of digital learning materials and participation in online discussions significantly contribute to developing university students' critical thinking skills. These findings indicate that e-learning is not only about providing content, but also about creating an interactive learning environment without time or space restrictions, allowing deeper analysis, reflection, and synthesis of the information provided. Increasingly, literature highlights the importance of usability to the success of e-learning systems. Ease of use consistently contributes to user satisfaction, system acceptance, and learning effectiveness. Ahmed et al. (2020) found that intuitive interface design can significantly reduce technological barriers, especially for less tech-savvy users, and thus smooth adoption and continued use. Likewise, Al-Marroof and Al-Emran (2018) found that Google Classroom integrates with tools such as Google Drive and Google Docs, which improves teaching, streamlines content management, and creates a coherent learning experience. In addition, Pappas (2015) found that Google Classroom's simple design makes it particularly useful in environments that demand quick implementation and low technical requirements. These studies support the idea that usability is more than a design exercise—it is a fundamental component of successful digital learning environments.

However, adopting e-learning systems still faces structural, social, and technical hurdles that may affect their effectiveness (Barikzai et al., 2024). The challenge is even stronger in fully online contexts and calls for instructional designs that explicitly consider interactive and socially engaging learning activities (Zhang et al., 2024). Technical constraints further compound these social challenges, especially in resource-limited contexts (Sharma, 2021). Social and infrastructural barriers can combine to form a vicious cycle: limited technology makes meaningful interaction with content difficult, further exacerbating learner disengagement.

Although many studies have examined Google Classroom use in Western countries, little research exists in the Middle East, especially Iraq. Current research tends to focus on students' experiences rather than faculty experiences, which are more fundamental because faculty design and facilitate digital learning environments. Additionally, few studies use a specific usability model, such as Nielsen's, systematically

to assess Google Classroom in resource-constrained environments. In this context, assessing the usability of e-learning platforms is an important area of research.

This study aims to analyse Google Classroom's ease of use by examining interface design, usability, and accessibility from a user experience perspective, specifically for teachers in educational institutions. This usability evaluation methodology uses a questionnaire to collect users' subjective experiences and identify the platform's strengths and challenges in a local educational context. The study is based on the Nielsen Usability Framework (Nielsen, 1993), a widely used framework for evaluating interactive systems that includes five key criteria: Efficiency, Effectiveness, Satisfaction, Learnability, and Memorability. As the literature shows, empirical research remains limited in systematically investigating the usability of Google Classroom in resource-constrained higher education settings using well-known usability frameworks. Specifically, few studies have evaluated usability from a faculty-centred perspective in Iraqi universities. This gap is critical to understanding how usability affects adoption, satisfaction, and continued use of e-learning platforms in educational system development, and to developing more user-friendly e-learning platforms.

This usability analysis of Google Classroom uses this framework to provide a systematic, theory-driven evaluation of its usability, identify design and functional gaps, and make evidence-based recommendations to improve it. Moreover, it aims to contribute to the literature, as little empirical research has examined how Google Classroom is used in a particular local context. The results will be useful for educators, platform developers and educational policymakers. They will help develop more effective e-learning systems and ensure that digital learning environments are more efficient, inclusive and user-friendly.

In Section 2, we organise the published work in this area. Section 3 presents the paper's methodology. Section 4 presents the results and discussion, and Section 5 summarises the paper and suggests future improvements in the field.

RELATED WORK

Google Classroom is a key focus in research on how platform usability affects teachers' and students' adoption of e-learning, identifying usability elements such as navigation, feedback, and accessibility as predictors of continued use. This section synthesises empirical results and usability frameworks to show how interface design and the Google Classroom user experience affect adoption rates, learning engagement, and strategies for institutional integration.

E-Learning

Many studies have shown that e-learning can improve students' academic performance, especially in blended learning. In this study, Vo et al. (2017) found that blended learning positively affected student performance in higher education. This improvement is attributed to the flexibility this learning model offers, allowing students to access a range of learning resources and progress at their own pace. E-learning is an active learning model with strong potential but also significant challenges. The literature suggests that its positive impact on student learning and cognitive function is linked to the quality of instructional design and flexibility. However, this effectiveness is impossible without addressing deep-rooted issues in social interaction and technological infrastructure. The results suggest that e-learning success is not just about introducing technology; it requires a strategic plan that aligns the educational, social, and technical aspects of implementation. The review highlights the importance of developing, designing, and testing educational programmes that are usable and can connect traditional and online education, aiming to build a communication bridge for virtual learners.

Usability

One of the key foundations of designing interactive systems is usability. It is the degree to which a system is usable and effective at achieving its objectives. It has evolved from a technical feature into a major element that shapes the overall user experience and customer satisfaction (Fauziah & Nurwulan, 2021). This literature review analyses and synthesises key studies on usability, beginning with the principles it is based on, then the methodologies used to evaluate usability, and its development into the broader concept of user experience (UX). Nielsen's (1994) pioneering work is widely regarded as a milestone in usability research. He laid down 10 heuristics for user interfaces. These principles, including "visibility of system state" and "user control and freedom," have formed the basis for many subsequent studies that implement and evaluate them.

In practice, following Nielsen's principles improves task efficiency and reduces mistakes, increasing conversion rates and sales volume. The field has transformed dramatically over the past 10 years, moving from a basic usability construct, functionality, to the broader concept of user experience (UX). This shift suggests that user satisfaction depends not only on task completion but also on the emotional and aesthetic aspects of the task. This aligns with the Nielsen study, showing that efficiency alone is no longer enough; satisfaction and enjoyment must be added to create a complete user experience. Usability is a key factor in e-learning platform design (Matraf & Hussain, 2018). Usability is not merely a technical characteristic of an interactive system, but a universal design principle that strongly affects the system's ultimate purpose. Usability principles are especially important when assessing educational platforms such as Google Classroom, where interface complexity can directly affect the educational process and outcomes. The next section reviews the previous studies that have used these principles specifically on Google Classroom.

Google Classroom

Several studies have assessed Google Classroom's effectiveness in enhancing educational performance. In this context, Iftakhar (2016) concluded that using the application positively affects students' engagement and interaction in class activities, resulting in improved achievement in the subjects taught through the application. The study revealed that the tools provided for assignment and test submission, along with immediate feedback, support students' self-learning. An educational tool is effective only when users accept it. In this regard, Adnan and Anwar (2020) investigated teachers' and students' perceptions of using Google Classroom in educational settings. The study found that users greatly appreciated the app's ease of use and user-friendly interface, which reduced the learning curve. They also commended its organisation, efficient dissemination of educational resources, and role in communication. However, some criticisms challenged these perceptions.

Many users find the app suitable for basic activities. In contrast, others believe it lacks advanced features found in more complex LMSs, such as detailed assessment systems or the ability to tailor content precisely. This indicates that Google Classroom is not seen as a replacement for existing LMS systems, but rather a supplement. However, a few hurdles remain in implementing Google Classroom. Among these challenges, poor technological infrastructure in some regions is the most significant, as unstable internet connections hinder effective use of the application. The study also included the need to train teachers to fully utilise the application's capabilities and move from traditional to innovative digital learning. The results show an urgent need. Although Google Classroom is well documented as usable in highly resourced settings, it needs to be explored in settings with limited infrastructure and training. This is especially true in developing areas where technology-related issues overlap with pedagogical issues.

Although existing studies have examined the effectiveness, acceptance, and challenges of Google Classroom, findings are scattered across three areas, usability, adoption, and context, underscoring the need

for an integrated analytical approach. Table 1 summarises the existing literature to inform the current research, organises key studies on e-learning, usability, and Google Classroom, and provides a structure to summarise prior work. The table identifies key findings and links each research stream to the gaps identified and the hypotheses generated in this study.

Table 1

Summary of Related Work and Its Link to Research Gaps and Hypotheses

Subsection	Main Findings	Implications for Usability & Faculty Experience	Link to Research Gap & Focus
E-learning (Effectiveness of e-learning and blended learning)	Blended and online learning environments enhance academic achievement when supported by flexible instructional design; effectiveness is constrained by social interaction and infrastructure limitations	The success of digital education depends primarily on platform accessibility, infrastructure stability, and instructional design.	Current studies focus on overall outputs but do not adequately measure how infrastructure constraints affect usability perceptions in higher education institutions in developing countries.
Usability (Usability principles and evolution toward UX)	High usability and positive UX improve efficiency, satisfaction, engagement, and motivation across domains	Usability is a critical determinant of user acceptance and sustained interaction with digital systems	Despite the richness of the theoretical aspect of ease of use, practical evaluation of instructors' experiences in Iraqi universities using approved frameworks (such as the Nielsen model) remains limited.
Google Classroom Assessment Features & Contextual Challenges	Google Classroom enhances engagement and achievement due to ease of use and feedback features; adoption challenges include limited advanced LMS functionality, infrastructure issues, and training gaps.	Usability and perceived ease of use are central to adoption, but institutional and technical factors moderate effectiveness.	Previous studies have assessed the platform's features or students' perspectives separately; this study fills the gap by assessing usability dimensions and contextual challenges for instructors at the University of Fallujah.

Note. UX = user experience; LMS = learning management system.

METHODOLOGY

Research Approach and Conceptual Framework

The usability evaluation followed Nielsen's Usability Framework: learnability, efficiency, memorability, error handling, and satisfaction are the five main dimensions of usability. This study used these dimensions to interpret faculty members' experiences with Google Classroom. The questionnaire also included

questions on functionality, security, interface design, accessibility, and infrastructural limitations. These factors were not considered original components of Nielsen's framework, but rather supplementary aspects of faculty experience. This distinction is important because factors like internet connection, device access, and institutional infrastructure can affect users' experience even if they are not intrinsic interface-usability qualities.

Overall faculty-perceived usability score, based on questionnaire items, was the primary outcome variable. The grouping variable for the comparative analysis was academic qualification, which included master's and doctoral degrees. The study was descriptive in nature, and for this purpose, the usability dimensions were tackled by posing the following research question:

RQ1: What is professors' and lecturers' experience using Google Classroom in terms of the application's usability dimensions, informed by Nielsen's framework, and related contextual factors at the University of Fallujah?

The comparative part was studied with the following hypotheses:

H1₀: The mean overall faculty rating of Google Classroom usability for teachers with master's degrees is not statistically different from the mean overall faculty rating of Google Classroom usability for teachers with doctorates.

H1_a: There is a statistically significant difference in the overall faculty-perceived usability score for Google Classroom between faculty with a master's degree and a doctoral degree.

This is equivalent to the independent samples t-test listed in the Results section. It also avoids including undefined constructs as independent variables (such as mediation pathways, perceived effectiveness, and intention to use) that were not measured or analysed in this study.

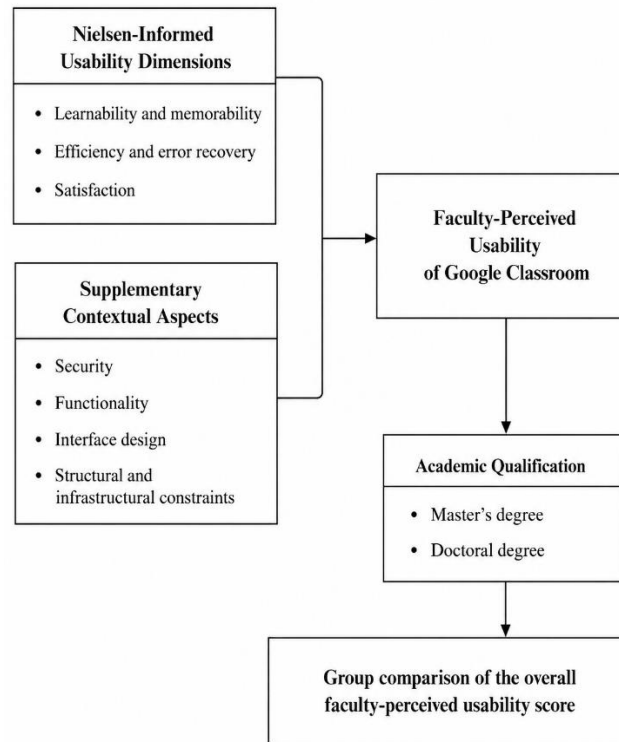
The target population was full-time faculty members at the University of Fallujah with teaching experience in Google Classroom. To be included in the study, participants had to:

1. have served as full-time professors at the University of Fallujah;
2. have been using Google Classroom for one or more full academic semesters, which in this study was considered to be at least 4 months; and
3. completed at least one full course using Google Classroom.

They excluded part-time teachers, those with less than the minimum required Google Classroom experience, and those without a direct teaching role in the school. The statistical analysis included 85 usable responses. Participating faculty members held Master's and Doctoral degrees. The target population included academic staff at the University of Fallujah and at the scientific and humanities colleges in Fallujah city and Fallujah governorate, Iraq. We collected information on gender, academic qualifications, and years of computer experience to describe the sample. The study used purposive sampling to recruit participants. Invitations were sent via institutional email and faculty communication groups. Figure 1 presents the proposed framework for assessing faculty perceptions of Google Classroom usability.

Figure 1

Conceptual Framework for Evaluating Faculty-Perceived Usability of Google Classroom



The framework in Figure 1 has two analytic parts. The descriptive component is a process that assesses faculty members' perceptions of Google Classroom in each of the identified usability components and contextual dimensions. This component contributes to addressing RQ1. Second, comparison grades the overall faculty-perceived usability score by academic qualification. Academic qualifications (master's and doctoral degree) are grouping variables, not causal predictors. An independent-samples t test evaluates this component and is a part of H1. The study proposes no causal, mediating, or moderating relationships between the framework's components because it used a cross-sectional, descriptive comparative design.

Questionnaire Development

We adapted questionnaire items from instruments measuring usability and user experience, such as the USE Questionnaire (Lund, 2001) and the User Experience Questionnaire (Darmawan et al., 2025), as well as security and usability literature. We customised the items to reflect faculty experiences using Google Classroom for teaching.

1. Demographic Profiles - Gender, academic qualification.
2. Usability Evaluation Items: 14 Likert scale items (1 = Strongly Disagree, 5 = Strongly Agree).

The face and content validity were ensured before the survey was given by a panel of experts who are knowledgeable in the field of educational technology and digital systems. We modified the items based on expert feedback to ensure they met Nielsen's usability criteria and addressed challenges associated with the regional structure. We calculated Cronbach's alpha in SPSS (v25) to assess internal consistency. The overall questionnaire had a Cronbach's alpha of 0.77, exceeding the academic research standard of 0.70 (Heale & Twycross, 2015) and indicating high measurement reliability.

Data Analysis Procedures

The quantitative survey data were processed and analysed in IBM SPSS Statistics Version 25 to answer the research question and to test the study hypothesis.

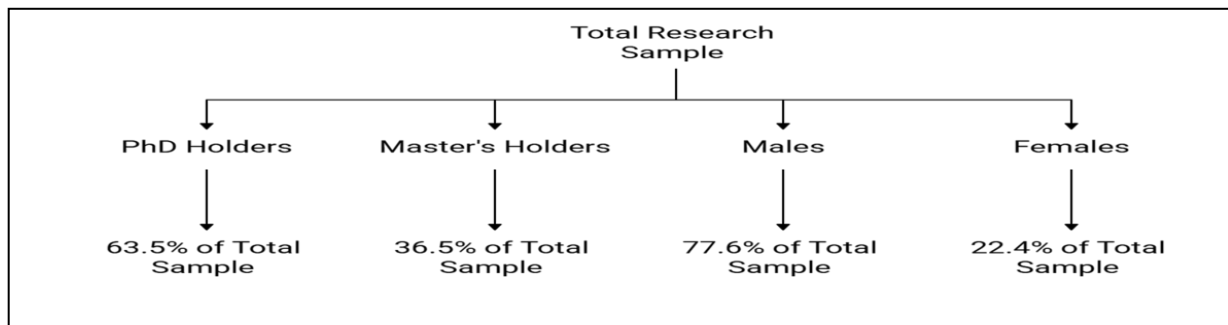
- **Descriptive Statistics:** Frequencies, percentages, means (M), and standard deviations (SD) were computed to explore faculty members' perceptions of the usability of Google Classroom on each of the Nielsen-informed usability dimensions and relevant contextual factors. To address RQ1, which aimed to determine faculty members' perceptions of Google Classroom's usability at the University of Fallujah, the number of faculty members using Google Classroom at the University of Fallujah was used.
- **Assumption Testing:** Before comparing, Levene's Test of Equality of Variances was applied to determine homogeneity of variances among the faculty members with master's and doctoral degrees. This test assessed whether the assumption of equal variances for parametric testing was met. To determine whether perceptions of Google Classroom usability differed by faculty qualification, an Independent-Samples t-test was performed at $\alpha = 0.05$. The analysis tested the null hypothesis (H_{10}). The t-test compared the mean usability scores of the two qualification groups to determine whether the difference was significant.

RESULT AND DISCUSSION

The study included 85 teachers. Many of them were male. Moreover, most participants held doctorates and had extensive computer experience. The population is 2000 people, as illustrated in Figure 2.

Figure 2

Demographic Profile of Respondents



Note. $N = 85$. Percentages are of the total sample.

Statistical analysis of usability dimensions and satisfaction: This study used Nielsen's Usability Framework to assess user experience by measuring the usability dimensions of ease of learning, efficiency, recall, security, and overall satisfaction. A possible research question for this data is: What are faculty perceptions of Google Classroom usability?

RQ1: Faculty Perceptions of Google Classroom Usability

This examination focused on faculty perceptions of Google Classroom's usability dimensions, informed by the Nielsen criteria and additional contextual factors. Table 2 presents the descriptive results at the item and dimension levels.

Table 2

Arithmetic Means and Standard Deviations of the Items and Dimensions of Usability and Satisfaction

Statements		Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Standard Deviation	General Direction
1	(learnability and memorability)						3.88	0.822	Agree
	X1 The Google Classroom application is easy to use	1	3	3	52	26	4.16	0.754	Agree
	X4 I quickly remember how to use the app.	2	8	22	44	9	3.59	0.890	Agree
2	Efficiency and error recovery						3.44	0.870	Neutral
	X2 Settings can be controlled	1	4	11	54	15	3.92	0.755	Agree
	X5 I can recover from mistakes quickly and easily.	2	24	35	18	6	3.02	0.938	Neutral
	X9 Downloading files and photos is easy and fast.	0	8	22	38	17	3.75	0.885	Agree
	X12 Downloading the Classroom application on a mobile phone is much easier than downloading it on a computer	4	15	22	33	11	3.38	1.069	Neutral
3	Security, functionality and design						3.70	0.913	Agree
	X3 It is useful and suitable for learning purposes.	1	3	10	57	14	3.94	0.730	Agree
	X6 high security	0	9	12	36	28	3.98	0.951	Agree
	X7 The interface of the application is attractive, so it attracts the student to use the application	2	9	35	35	4	3.35	0.827	Neutral
	X8 The application interface is sufficient and does not need to add other functions to help the student complete his work	2	19	21	37	6	3.31	0.976	Neutral

4	Structural and infrastructural constraints						4.10	0.946	Strongly agree
	X10 Not everyone is allowed to attend the meeting without permission	2	6	12	45	20	3.88	0.931	Agree
	X13 It needs a high internet signal	0	4	13	37	31	4.12	0.837	Agree
	X14 Google Classroom is free	3	6	8	33	35	4.07	1.055	Agree
5	Satisfaction and acceptance						3.75	0.898	Agree
	X11 I am satisfied with the application	2	6	17	46	14	3.75	0.898	Agree
	All phrases						3.73	0.450	Agree

Note. Values under the five response options are frequencies ($N = 85$). Items were rated on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). Bold rows give dimension-level means and standard deviations.

Table 2 presents the analytical results for faculty members' satisfaction with using Google Classroom at the University of Fallujah, showing a generally positive trend: the overall satisfaction item (X11) had a mean of 3.75, indicating high satisfaction. This agrees with the top spot in Nielsen's design items list for the criterion "Learnability" (item X1: "Application Usability") with a mean score of 4.16. This high score suggests that the platform's simple architecture and straightforward interface design effectively reduce the learning curve for teaching staff, aligning with Iftakhar (2016) and Al-Marouf and Al-Emran (2018). However, a closer look shows a distinct difference between the ease of the procedure and effective control and response to the emergency. The lowest mean across all assessment items was for item X5 ("Ability to recover and undo errors quickly and easily"), and it was neutral. The lack of feedback mechanisms and flexible undo options violates Nielsen's efficiency and control requirements. This indicates that instructors need more flexible control and guidance tools when an assignment or test is organised incorrectly. In terms of structure, the mean score for Item X13 (Need for high-speed internet) was 4.12. This study highlights the need to consider this environmental constraint when evaluating user interface usability. A high score on this item (X13) reflects the structural difficulty of developing educational environments because of weak network infrastructure, not a positive design aspect. This finding contrasts with previous studies in developed countries that assume a permanently available and stable network connection.

H1: Difference in Overall Usability by Academic Qualification

The Overall Usability score measures this H1. The study tested the effect of Academic Qualifications (Master's Degree and PhD) on instructors' perceptions of the usability dimensions and overall satisfaction (Analysis of Demographic Homogeneity). It used an independent-samples t-test, as shown in Table 3.

Table 3

Independent Samples t-Test of Overall Usability by Academic Qualification

			Levene's Test for Equality of Variances		t-test for Equality of Means		
			<i>F</i>	<i>Sig.</i>	<i>t</i>	<i>df</i>	<i>Sig. (2-tailed)</i>
Mean	Equal variances assumed		1.516	.222	-.069	83	.945
	Equal variances not assumed.				-.075	78.097	.941

Note. Grouping variable: academic qualification (master's vs doctoral degree); dependent variable: overall faculty-perceived usability score. Sig. = significance (*p*).

Levene's homogeneity test showed homogeneity between the two groups ($F = 1.516$; $p = 0.222$). The t-test results also showed no statistically significant differences between the two groups (PhD and Master's) at the $\alpha = 0.05$ level ($p = 0.945$). This result reflects the high similarity and homogeneity between the two academic groups at the University of Fallujah, both statistically and empirically. This is because Google Classroom's simple interface relies on a forgiving design and basic tools that do not require programming or technical skills that vary by teaching level. Thus, users' academic experience did not differ; rather, the platform's nature and ease of access did.

Limitations and Future Work

The present study has some methodological limitations, which create opportunities for further studies:

1. Measurement Approach: Using self-reported survey data may lead to response bias. Future studies should use mixed-methods designs with think-aloud protocols, screen recordings, and task-based performance criteria to provide objective usability data.
2. Sample and Scope: Faculty members of one institution were used as the sample and scope.
3. Future studies could be extended to students and administrative staff from a larger number of public and/or private universities, which would increase external validity.
4. Temporal Design: This is a cross-sectional study, so it is not possible to track perceptions of usability over time. We recommend using longitudinal research to track users' skill growth over several academic terms.
5. Future studies should incorporate integration of Nielsen's usability criteria with technology acceptance models (e.g. TAM or UTAUT), in order to explore the relationship between interface usability and platform usage intention and continued platform usage in the face of infrastructural limitations.

CONCLUSION

Google Classroom is a digital learning environment that meets communication and collaboration needs, helps manage the teaching process efficiently, and has become one of the most prominent e-learning platforms. In theory, this research empirically tests the applicability of Nielsen's Usability Framework in a developing-country higher education setting. It explores how the software's interface design interacts with external constraints. A usability study of Google Classroom with 85 faculty members at the University of

Fallujah found overall satisfaction was high ($M = 3.75$). The results showed that the platform met baseline usability requirements, demonstrating usability and a low learning curve. The measurement instrument had good internal consistency (Cronbach's $\alpha = 0.77$) and was validated by expert panels for face and content. Inferential statistical analysis also confirmed demographic homogeneity, revealing no statistically significant differences in usability perceptions between Master's and Doctoral degree holders ($t(83) = -0.069$, $p = 0.945$). Although these results were positive, the study identified the following operational issues: error recovery (Item X4), undo capabilities (Item X5), and excessive dependence on stable network infrastructure (Item X13). They show that the interface is learnable, but external infrastructural bottlenecks and limited error-tolerance mechanisms limit usability.

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