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# Faculty perspectives on blended learning in Jordanian universities: opportunities and challenges

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Blended learning has become an integral part of higher education. It offers a combination of traditional and digital learning approaches. In Jordanian universities, the effectiveness and adoption of blended learning remain topics of interest, particularly from the perspective of faculty members. This study examines the current status of blended learning in Jordanian universities from the perspective of faculty members. A descriptive Approach was adopted, and a questionnaire was developed and administered to a random sample of 131 faculty members selected from three universities: the University of Jordan, Al-Balqa Applied University, and Amman Arab University. The findings indicate that faculty members' satisfaction with strategies for engaging with blended learning models was moderate. Additionally, no statistically significant differences were identified in the participants' perceptions of blended learning status based on gender or years of experience ( $\alpha = 0.05$ ). The study recommends providing faculty members with training in blended learning methodologies, essential computer applications, and augmented reality technologies to enhance their skills and engagement with blended learning.

## KEYWORDS

blended learning, faculty members, e-learning, culture, higher education

## Introduction

Blended learning (BL) combines traditional classroom instruction with digital online activities to create flexible and adaptive educational environments. Despite global recognition of BL's potential, implementation varies significantly due to contextual factors such as infrastructure readiness, cultural attitudes toward technology, and faculty preparedness. Extensive international research underscores the importance of BL; however, few studies address its specific dynamics and effectiveness within Jordanian higher education, revealing a notable research gap. This study explicitly addresses the limited empirical exploration of Jordanian faculty members' perspectives, whose readiness and acceptance are critical to successful BL implementation, thereby filling significant literature gaps.

According to [Abusaleem et al. \(2024\)](#), BL integrates traditional face-to-face teaching methods with online and digital learning activities, providing dynamic and flexible educational experiences. It has emerged as a strategic approach capable of addressing the limitations of traditional classroom teaching, such as fixed schedules, limited learner autonomy, and insufficient resource availability, by enabling greater accessibility and

personalization of education. Indeed, BL not only facilitates continuous engagement between instructors and students but also offers an adaptable framework suited to various learning environments and institutional contexts.

Despite the global trend toward BL adoption, its implementation is often influenced by contextual factors that differ significantly across regions and educational institutions. Several international studies emphasize the varying levels of readiness among instructors and students, challenges related to infrastructure, and cultural acceptance toward technology-based learning (Goosen and Heerden, 2017; Draissi and Yong, 2020; Osman, 2023). Although these studies underline important issues, very few empirical studies have explored the specific dynamics and effectiveness of BL practices in Middle Eastern countries, particularly in the context of higher education institutions in Jordan.

Previous research in Jordan and similar contexts has predominantly focused on primary education or general perceptions toward e-learning (Al-Fawara, 2021; Abu Shkheidem et al., 2020). However, limited scholarly attention has been given specifically to faculty perspectives in higher education institutions, where the successful implementation of BL critically depends on faculty readiness, acceptance, and their interaction with students through digital platforms. This represents a clear gap in existing literature that warrants detailed investigation.

Furthermore, previous studies addressing gender differences in faculty acceptance of technology-supported education have presented mixed results. For instance, Metwally (2022), Al-Zahrani (2021) reported no gender differences, while other studies have noted gender-specific challenges in technology adoption due to cultural and social factors, especially within Middle Eastern academic contexts. Given this discrepancy in findings, further investigation into gender as a variable influencing BL adoption among faculty members is justified, providing nuanced insights into institutional policy-making and targeted training needs.

Moreover, exploring faculty perspectives in different institutional contexts—public, private, and technical universities—enables a deeper understanding of the contextual variability influencing BL implementation. Given that Jordanian universities exhibit diverse technological infrastructures, pedagogical traditions, and resource allocations, studying faculty perceptions from multiple types of institutions provides comprehensive insight into the complexities and challenges faced by universities with varying levels of digital readiness.

Thus, the rationale behind this research lies in addressing these distinct gaps in current academic literature. Specifically, this study aims to:

1. Explore faculty perceptions of the current state and effectiveness of BL in Jordanian higher education.
2. Investigate faculty-reported challenges and opportunities associated with BL implementation, considering specific institutional contexts (public, technical, and private).
3. Analyze potential variations in BL perceptions based on gender and faculty experience to clarify existing discrepancies reported in literature.

By addressing these gaps, the study intends to provide actionable insights and inform policies aimed at improving faculty engagement with blended learning strategies. The findings will be beneficial not only to Jordanian educational stakeholders but also offer comparative insights for international readers interested in BL dynamics in developing and culturally diverse contexts.

## Study problem

Despite legislative efforts, such as Jordan's Blended Education and Learning System Law No. 69 of 2021, comprehensive adoption of blended learning remains moderate across Jordanian universities. Prior studies generally highlight BL's benefits but rarely examine the specific challenges faced by Jordanian faculty, including inadequate training, infrastructure deficiencies, administrative constraints, and cultural acceptance barriers. These underexplored issues significantly affect faculty willingness and capacity to adopt BL. This research explicitly targets these challenges, seeking detailed insights into why BL adoption remains moderate and identifying actionable strategies for improvement.

Hence, the rationale of this research is founded on addressing these specific gaps by closely examining the lived experiences and perceptions of faculty members regarding BL practices. This study seeks to identify precisely why BL adoption is moderate rather than robust, exploring factors such as technological preparedness, infrastructural capabilities, administrative and policy support, as well as faculty attitudes and training needs. By pinpointing these under-explored areas, the current research aims to provide actionable insights that will inform strategic improvements and targeted interventions essential for the effective and sustained implementation of blended learning in Jordanian higher education institutions.

## Study questions

1. What is the current status of blended learning in Jordanian universities from the perspective of faculty members?
2. Are there statistically significant differences at the level of ( $\alpha = 0.05$ ) between the means of the study sample's estimates of the current status of blended learning in Jordanian universities from the perspective of faculty members attributed to variables such as gender and years of experience?

Previous studies in the region have suggested potential differences in faculty engagement with blended learning based on gender, influenced by cultural contexts or differential access and attitudes toward technological resources. For instance, studies by Al-Zahrani (2021), Al-Fawara (2021) reported contrasting findings regarding gender-based differences in attitudes and engagement with digital learning platforms. Therefore, examining gender allows for insights into whether these observed trends are consistent across different educational contexts in Jordan.

Faculty experience levels might influence familiarity with, attitudes toward, and implementation proficiency of blended learning strategies. Experienced educators might differ from their

less experienced peers in openness to adopting digital tools, efficiency in integrating technology with traditional teaching methods, or in responding to institutional support. Studies such as [Almousa et al. \(2023\)](#), [Al-Mashharawi \(2020\)](#) have demonstrated varying outcomes concerning the impact of experience on technology adoption in education.

## Study objectives

1. To understand the current status of blended learning from the perspective of faculty members in Jordanian universities.
2. To determine the possibility of finding a statistically significant differences at the level of ( $\alpha = 0.05$ ) between the means of the study sample's estimates of the current status of blended learning from the perspective of faculty members in Jordanian universities attributed to variables such as gender and years of experience.

## Importance of the study

**First, Theoretical Importance:** This study provides a comprehensive theoretical framework about the current status of blended learning from the viewpoint of faculty members. It aims to identify its obstacles, determine its main benefits, and offer a clear and practical understanding of the current state of blended learning. Furthermore, it aims to identify proposals that may contribute to improving and developing the current status of blended learning implementations.

**Second, Practical Importance:** It is expected that this study will benefit faculty members and students in Jordanian universities by identifying strengths and weaknesses in the implementation stages of blended learning skills. Additionally, it may provide insights for programmers and planners in the Ministry of Education and the Ministry of Higher Education to evaluate and enhance electronic learning platforms.

## Literature review

Blended learning has consistently shown promise in enhancing educational effectiveness globally. However, Middle Eastern, specifically Jordanian, studies remain scarce. Regional studies highlight unique educational, cultural, and technological factors affecting BL adoption, providing essential comparative insights for international audiences. Previous research has often overlooked higher education faculty perspectives, focusing predominantly on primary education or general perceptions of e-learning [e.g., [Maqbool et al. \(2023\)](#); [Johnson et al. \(2022\)](#)]. This study explicitly targets faculty members in higher education, addressing this crucial research gap.

In the Jordanian context, Al. [Fayyumi et al. \(2021\)](#) found that while university faculty members acknowledged the importance of blended learning strategies, their actual application remained moderate, suggesting a gap between awareness and practice. [Haider](#)

and [Al-Salman \(2023\)](#) observed discipline-specific differences, reporting that faculty members from the humanities expressed greater satisfaction with remote teaching effectiveness than those in the sciences. [Alnemrat et al. \(2023\)](#) further confirmed that faculty at Yarmouk University demonstrated both high levels of e-learning knowledge and frequent usage, accompanied by positive attitudes toward digital tools. However, the availability of infrastructure and institutional support remained a limiting factor, as emphasized by [Hassan et al. \(2022\)](#), who highlighted the need for improved technical readiness and organizational planning. Similarly, [Awajan et al. \(2024\)](#) concluded that while blended learning improved student outcomes in some programs, satisfaction varied significantly by faculty discipline, indicating the need for targeted support and training.

International studies echo similar findings while offering additional perspectives. [Korsah \(2024\)](#), for instance, investigated faculty adoption of Moodle as a learning management system in Ghana and found that social influence was a key determinant in faculty willingness to adopt online teaching technologies, underscoring the role of peer support and institutional leadership. Similarly, [Bervell et al. \(2022\)](#) demonstrated that faculty members' previous experience with technology and their self-efficacy strongly influenced their use of LMS platforms, reinforcing the importance of professional development. In South Africa, [Sihlangu and Kheswa \(2023\)](#) highlighted the challenges faced by physics tutors during the transition to remote teaching, such as low student participation and unstable internet access, stressing the need for more resilient infrastructure and interactive methods. [Gonzalez and Moore \(2020\)](#) compared faculty and graduate student perspectives and revealed that both groups highly value interpersonal connections and structured learning environments in online settings, pointing to the need for strong instructional design and presence. These international insights affirm that faculty readiness, contextual infrastructure, and institutional strategies are crucial elements for successful blended learning implementation in higher education.

[Fayyumi et al. \(2021\)](#) assessed the extent of blended learning implementation among faculty members in Jordanian universities. Employing a descriptive survey methodology, the study utilized a questionnaire distributed to 62 faculty members across three Jordanian universities. The study revealed that faculty members' satisfaction with blended learning strategies was above average. Consequently, the study recommended the necessity of training both faculty members and students on how to effectively employ interactive learning strategies within the blended learning system.

Similarly, [Almousa et al. \(2023\)](#) conducted a study aimed at understanding teachers' attitudes toward blended learning and identifying their training needs. The study utilized a descriptive correlational approach, with the research tool being a questionnaire developed for this purpose. The study sample consisted of 119 teachers and educators, randomly selected. The study results indicated that teachers' attitudes toward blended learning were of moderate degree, with an overall mean score of 3.60. Furthermore, the results showed a positive relationship between teachers' attitudes toward blended learning and their training needs. The study recommended training teachers on blended learning strategies.

In Morocco, [Draissi and Yong \(2020\)](#) conducted research on blended learning implementation at Moroccan universities through content analysis. Their study identified increased student

autonomy and improved access to learning resources due to blended learning approaches. However, faculty reported moderate levels of additional administrative duties and challenges associated with managing the blended learning environment.

Osman's (2023) study aimed to explore the current status of the hybrid education system at South Valley University in Egypt, and to develop a proposal for its implementation procedures. The research employed a descriptive survey methodology, with the research tool being a questionnaire developed by the researcher. The study sample consisted of a representative sample of faculty members at South Valley University, totaling 400 teaching staff members. The study found that the hybrid education system fulfilled its role to a moderate extent across the educational, environmental, and service dimensions. It also proposed a conceptual framework for the development of the hybrid education system at South Valley University, highlighting how the hybrid teaching process assists faculty members in addressing study-related challenges.

Al-Anzi (2023) conducted a study aiming to identify the current status of the requirements for transforming Kuwait University into a smart university from the perspectives of faculty members. The study population included all faculty members at Kuwait University, with a research sample consisting of 92 faculty members. The researcher adopted a descriptive approach and utilized a questionnaire as a research tool. The research findings indicated that the current status of the requirements for transforming Kuwait University into a smart university, from the viewpoint of faculty members, received a high level of responsiveness. The technological requirements domain ranked first, followed by organizational requirements. The study recommended the necessity of establishing a digital transformation unit within Kuwait University in collaboration with the Information and Communication Technology Center and the Training Center at the university.

Al-Alouni's (2022) study aimed to identify the opportunities and challenges regarding the deployment of the Internet of Things (IoT) in Saudi universities from the perspective of faculty members. The study employed a descriptive methodology, utilizing a researcher-developed questionnaire as its research tool. It was applied to a sample of faculty members in Saudi universities, totaling 23 individuals, to ascertain the most significant opportunities and challenges for IoT in various areas. The study categorized these areas into seven domains, including education and learning, human resources, energy, transportation, public facilities, security and safety, and data analysis. The study's results revealed multiple opportunities for IoT in the university setting, which could significantly contribute to enhancing the educational process and environment. These opportunities include sending notifications related to smart systems, energy conservation, and decision-making.

Alshehri and Alahmari's (2021) study aimed to identify the requirements for using e-learning in teaching Sharia sciences at Shaqra University in the context of the COVID-19 pandemic from the perspective of faculty members. To achieve this goal, the researcher prepared a questionnaire to identify the requirements of e-learning from the perspective of faculty members. The sample consisted of 36 faculty members. The study's results indicated the necessity of having specific technological and training indicators for e-learning in curriculum, faculty, educational environment, learner,

and e-learning management system. The responses of the sample members to all questionnaire items were high.

The aim of Metwally's (2022) study was to identify the training needs of new faculty members at the College of Education, Al-Azhar University, from their perspective in light of digital transformation requirements. The study employed a descriptive survey methodology, and the research tool used was a questionnaire developed by the researcher. The study sample consisted of 54 faculty members. Among the principal findings was the identification of a substantial level of needs for training across various academic domains among the new faculty members, notably in the realm of technological needs. Furthermore, the study revealed no statistically significant disparities in responses among the sample participants concerning gender or college affiliation.

Fayyoubi et al. (2021) conducted a study aimed at assessing the extent of implementation of blended learning strategies among faculty members in Jordanian universities. Employing a descriptive survey methodology, the study utilized a questionnaire developed by the researchers. The questionnaire was distributed to 62 faculty members across three Jordanian universities: Amman Arab University, University of Jordan, and Al-Hussein Bin Talal University. The study revealed that faculty members' satisfaction with the use of blended learning was higher than the average level. Consequently, the study recommended the necessity of training both faculty members and students on how to effectively employ interactive learning strategies within the blended learning system.

Al-Zahrani's (2021) study aimed to explore the impact of using e-learning on the development of some concepts of digital citizenship and digital communication among faculty members at the College of Education, Umm Al-Qura University. The study utilized a descriptive methodology, with the study tool being a questionnaire distributed to a sample of 102 faculty members. The findings of the study emphasized the importance of employing digital communication technologies, such as social networking platforms, to support student activities, with an average rating of (4.15 out of 5). Furthermore, the study revealed no statistically significant differences in the responses among the study sample based on gender.

Abu Shkheidem et al. (2020) conducted a study in Palestine aimed at investigating the effectiveness of e-learning from the perspective of faculty members at Khudari University. They employed a descriptive-analytical methodology, with a study sample consisting of 50 faculty members. A questionnaire was used as the study tool. The results indicated that the sample's evaluation of the effectiveness of e-learning from their perspective was moderate. Their assessment of the continuity of e-learning, the obstacles to its use, faculty members' interaction with e-learning, and students' interaction with e-learning were all rated at a moderate level.

In a study conducted by Draissi and Yong (2020) aiming to assess the status of blended learning in Moroccan universities, a content analysis methodology was employed. The study tool consisted of a questionnaire comprising 32 items. The study population included 125 faculty members. The results of the study indicated that employing lecture teaching methods aligned with blended learning strategies led to increased student independence and facilitated access to e-learning platforms. Moreover, the level of additional duties assigned to faculty members to maintain their workflow from home was rated at a moderate level.

The findings from previous studies indicate that while blended learning has significant potential to enhance teaching and learning experiences, challenges such as training, institutional support, and technological readiness must be addressed to maximize its effectiveness. This review highlights the need for further research on the implementation of blended learning strategies, particularly in Jordanian higher education institutions, to ensure a more comprehensive understanding of faculty engagement and instructional effectiveness.

## Study methodology

### Research design

This study employed a descriptive quantitative survey design aimed at exploring the perceptions of faculty members in Jordanian universities toward blended learning. The approach allowed for the systematic collection and analysis of data to evaluate the current status, effectiveness, and challenges of blended learning implementation in higher education institutions.

### Population and sample

The study population consisted of faculty members from Jordanian higher education institutions. A simple random sample of 131 faculty members was drawn from three universities: the University of Jordan (a major public university), Al-Balqa Applied University (a technical and applied sciences institution), and Amman Arab University (a private university). These institutions were selected to capture diverse institutional contexts—public, private, and technical—ensuring the representativeness of varying technological infrastructures, administrative frameworks, and faculty experiences across the Jordanian higher education system. The sample included faculty members who were actively engaged in teaching during the 2023–2024 academic year and had experience with blended learning platforms. The sample included 66 males and 65 females. Participants held various academic ranks, including assistant, associate, and full professors. Their years of teaching experience ranged from 1 to over 20 years. All participants had at least some exposure to blended learning systems during the 2023–2024 academic year.

### Informed consent

Participants were informed of the study's objectives, their voluntary participation, and assured anonymity and confidentiality before providing consent. A questionnaire was developed consisting of 29 items. The researchers relied on educational literature and relevant previous studies related to the study variables in designing and developing the tool. They also sought the opinions of 13 experts, who were faculty members specializing in curriculum and teaching methods, assessment, and evaluation. These experts reached a consensus on the suitability of the items at an 80% agreement rate and on extracting the correlation coefficient between the item and the domain. Respondents were

required to indicate their level of agreement with each item using a five-point scale: Very High, High, Moderate, Low, and Very Low. The tool was weighted accordingly with scores of (5, 4, 3, 2, 1) assigned to the ratings. These items were constructed based on a comprehensive review of prior studies and validated instruments related to blended learning [e.g., Fayyoubi et al. (2021); Almousa et al. (2023); Osman (2023)].

The instrument was structured into three key dimensions:

1. Effectiveness of Blended Learning from Faculty Members' Perspective (15 items).
2. Students' Interaction with Blended Learning (5 items).
3. Current Requirements for Implementing Blended Learning (9 items).

### Content validity

The validity of the study tool was confirmed by presenting it to 13 expert reviewers who are faculty members specializing in curriculum and teaching methods, assessment, and evaluation at Jordanian universities. Their feedback and suggestions were considered, particularly regarding the linguistic accuracy of the items, the relevance of each item to its designated domain, the coherence of the items, and their alignment with the study's scope. All necessary adjustments were made based on their recommendations. With an agreement rate of 80% among the reviewers, the study tool was finalized and deemed valid for use.

### Construct validity

To ensure construct validity, the instrument was piloted on a sample of 39 faculty members outside the main study group. The correlation coefficients between the score of each item and the total score of its respective domain were calculated. Additionally, correlation coefficients between the score of each domain within the questionnaire and the total score of the questionnaire were computed, as shown on Table 1.

Table 1 shows that the correlation coefficients between the items of the tool, the study domains, and the total tool were appropriate. The correlations between the tool items and the study domains, as well as between the domain items and the total tool, were greater than 0.20, which is suitable for achieving the objectives of this study.

### Stability of the study tool

The researchers used two methods to verify the stability of the study tool. The first method is testing and retesting, and the second method is calculating the Cronbach coefficient for the questionnaire items. In the first, the questionnaire was applied to the exploratory sample twice, and the number of its members was (39) faculty members from outside the study sample, with a difference period of two weeks, and the Pearson correlation coefficient (reliability coefficient) was calculated between the two applications. In the second method, the internal consistency

**TABLE 1** The correlation coefficients between the items of each domain and other domains and the status of blended learning from the point of view of faculty members.

Domain	Item no.	Item	Correlation coefficient	
			Tool	Domain
Effectiveness of Blended learning from faculty members point of view	1	Students can ask any questions through blended learning procedures	0.316**	0.381**
	2	Blended learning encourages students toward self-directed learning	0.359**	0.469**
	3	Smooth transition is possible from traditional to blended learning	0.350**	0.399**
	4	Blended learning system allows students access to educational material anytime	0.301**	0.425**
	5	Blended learning contributes to comprehensive understanding of course material	0.332**	0.449**
	6	Computerized instructional material provides students with research skills	0.359**	0.458**
	7	Blended learning achieves intended goals of higher education	0.404**	0.490**
	8	Blended learning contributes to the continuity of the university educational system	0.341**	0.437**
	9	Evaluation methods employed achieve objectives of blended learning programs	0.461**	0.513**
	10	Students believe blended learning is a suitable alternative to traditional learning	0.410**	0.490**
	11	Blended learning increases the workload of technical and administrative university students	0.250**	0.330**
	12	Faculty members respond to students' academic feedback	0.352**	0.427**
	13	Faculty members possess skills to deal with computer applications relevant to the specialization	0.407**	0.478**
	14	Blended learning provides smooth communication between administration and students	0.409**	0.486**
	15	Faculty members can employ non-university digital platforms	0.467**	0.557**
Students' interaction with blended learning from faculty members point of view	16	Students accept all transitions to blended learning with satisfaction	0.492**	0.578**
	17	Suitable training for students on using synchronous learning platforms is not available	0.394**	0.486**
	18	Students interact with each other through the university blended learning platform	0.550**	0.659**
	19	Students submit assignments within the specified time	0.487**	0.582**
	20	Faculty members provide incentives to students through e-learning	0.531**	0.640**
Blended learning current status from faculty members point of view	21	The university possesses necessary infrastructure for quality blended learning	0.499**	0.572**
	22	The university provides suitable educational programs and technologies	0.486**	0.555**
	23	There are permanent supervisors for devices and tools used in education	0.502**	0.550**
	24	Students are regularly trained on using e-learning technologies	0.492**	0.590**
	25	There is a guiding manual for students on how to use blended learning platform	0.467**	0.591**
	26	Faculty members always work on raising awareness of the importance of blended learning	0.452**	0.538**
	27	Blended learning reduces interaction and communication between students and faculty members	0.358**	0.445**
	28	Some students do not have specific means for e-learning	0.382**	0.509**
	29	Some students lack skills to deal with e-learning technologies	0.350**	0.438**

\*The level of statistical significance is equal to 0.05. \*\* The level of statistical significance is equal to 0.01.

TABLE 2 The reliability coefficient of the test-retest and internal consistency, Cronbach's alpha, for the tool assessing blended learning from the viewpoint of faculty members as a whole and across its domains.

Scale and its domains	Item	Internal Consistency (Cronbach's alpha)	Test-retest reliability
Effectiveness of blended learning from faculty members viewpoint	15	0.89	0.92
Students' interaction with blended learning	5	0.91	0.90
Blended learning current status from faculty members viewpoint	9	0.92	0.93

reliability coefficient was calculated through Cronbach's alpha coefficient, and (Table 2) shows this.

The results in Table 2 indicate that the Pearson correlation coefficient between the scores of respondents on the tool in the domain of test-retest reliability in blended learning reality reached an overall reliability coefficient of (0.93). As for the internal consistency reliability coefficient, Cronbach's Alpha, for the entire tool, reached (0.92). It is noted that these coefficients exhibit high reliability, thus considered suitable for the purposes of this study, ensuring the achievement of its objectives and the trustworthiness of its results. The term "moderate" is used throughout the study to represent mean scores that fall between 2.60 and 3.39 on a five-point Likert scale, based on standard interpretation in educational research literature.

## Correcting the study tool

To calculate the total score of the tool, five alternatives were provided, from which the respondent selects one that represents their opinion. Scores of (5, 4, 3, 2, 1) were assigned to these five alternatives, respectively for each item. A score of (5) indicates "Very High," (4) indicates "High," (3) indicates "Moderate," (2) indicates "Low," and (1) indicates "Very Low" for each alternative.

## Study procedures

To answer the study questions objectively, the researchers followed the following procedures:

- Review theoretical literature and previous studies related to the subject of the study.
- Obtaining official books from the relevant authorities to facilitate the researchers' tasks for the purposes of implementing the study.
- Preparing the study tool, presenting it to arbitrators and specialists in the educational field, to ensure its validity and reliability, and amending paragraphs that contained moral or spelling errors or required reformulation, or adding a paragraph in light of the arbitration results.
- Verifying the validity and reliability implications of the study tool using the Pearson correlation coefficient and the Cronbach alpha equation.
- Selection of study individuals.
- Applying the study tools to the study sample by distributing questionnaires, during the first semester of the year 2023/2024.

- Collect and analyze data using the statistical package (SPSS).

1. Discussing the results and proposing appropriate recommendations in light of the results.

## Statistical processing methods

- Correlation coefficients to examine the internal and structural validity of the study tools.
- Cronbach's alpha to examine the reliability of the study tools.
- Extracting arithmetic means and standard deviations, to measure the current status of blended learning in Jordanian universities from the point of view of faculty members and students.
- Analysis of variance to measure the variables: gender, and the effect of the number of years of service, on the current status of blended learning in Jordanian universities from the point of view of faculty members and students.
- Analysis of independent sample *t*-tests to measure the impact of gender on the current status of blended learning in Jordanian universities from the point of view of faculty members and students.

## Presentation of results

### Results of the first question

- What is the current status of blended learning in Jordanian universities from the viewpoint of faculty members?

To answer this question, the arithmetic means and standard deviations were calculated for the estimations of the study sample on the items of blended learning current status in Jordanian universities from the viewpoint of faculty members, and for each domain within it. Table 3 below illustrates this.

Table 3 presents the faculty members' overall perceptions of blended learning across three key domains: the effectiveness of blended learning, students' interaction with blended learning strategies, and the institutional requirements for implementation. All domains were rated at a moderate level, with mean scores ranging from 2.91 to 2.97. The highest-rated domain, *Effectiveness of Blended Learning* ( $M = 2.97$ ,  $SD = 0.46$ ), reflects faculty members' recognition of blended learning's potential to enhance educational

**TABLE 3** The arithmetic means and standard deviations of the study sample's estimations on the items of blended learning in Jordanian universities from the viewpoint of faculty members.

Domain no.	Domain	Mean	Standard deviation	Rank	Grade
1	First domain: effectiveness of blended learning from the viewpoint of faculty members	2.97	0.46	1	Average
2	Second domain: students' interaction with blended learning strategies	2.91	0.60*	3	Average
3	Third domain: requirements of blended learning from the viewpoint of faculty members	2.96	0.56	2	Average
Blended Learning current status		2.95	0.45	–	Average

\*The lowest score (1) and the highest score (5).

delivery, including improved access to instructional materials and support for student autonomy. However, the moderate score also implies that this potential has not been fully realized due to limitations in current practices or support mechanisms. The second-highest domain, *Requirements of Blended Learning* ( $M = 2.96$ ,  $SD = 0.56$ ), indicates that while some structural and technical components are in place—such as educational platforms and instructional tools—gaps remain in infrastructure, faculty training, and student preparedness. The lowest-rated domain, *Students' Interaction with Blended Learning* ( $M = 2.91$ ,  $SD = 0.60$ ), highlights concerns related to student engagement, such as limited interaction with digital platforms, insufficient training, and delays in assignment submissions. These findings suggest that while faculty members view blended learning positively in principle, successful implementation is hindered by both technical constraints and the need for improved engagement strategies for students and instructors alike.

### The first domain, “effectiveness of blended learning from the viewpoint of faculty members”

Arithmetic means and standard deviations were extracted for the estimates of the study sample on each item within the domain as shown in Table 4.

It is noted from Table 4 that the arithmetic means for the domain items ranged between (2.89) and (3.07) to a moderate degree, as paragraph (2), which stated: “Blended learning motivates students to self-directed learning” came in first place with an arithmetic mean of (3.07), and a standard deviation (1.03), with a moderate degree, while paragraph (6), which states: “Computer-based educational material provides students with research skills,” came in last place, with a mean (2.89), and with a standard deviation (1.05), and a moderate degree.

### The second domain: student interaction with blended learning from faculty members viewpoint

Arithmetic means and standard deviations were calculated for the estimates of the study sample individuals on each item of the domain, as shown in Table 5.

From Table 5, it is observed that the arithmetic means of the items in the domain ranged between 2.84 and 2.97, indicating a moderate level. Paragraph (2), which stated: “There is no adequate training available for students to use blended learning platforms,” ranked first with an arithmetic mean of 2.97 and a standard deviation of 1.05, indicating a moderate level. Whereas, paragraph (4), which stated: “Students submit educational assignments on time,” ranked last with an arithmetic mean of 2.84 and a standard deviation of 1.02, also indicating a moderate level.

### The third domain: requirements of blended learning from the faculty members' point of view

The arithmetic means and standard deviations were extracted for the estimates of the study sample individuals for each item in the domain, as shown in Table 6.

Table 6 outlines faculty perceptions regarding the institutional and student-related requirements necessary for effective blended learning implementation. Overall, the results indicate a moderate level of satisfaction, with item means ranging from 2.86 to 3.05. The highest-rated item, “Some students possess skills in dealing with computers and blended learning” ( $M = 3.05$ ), suggests partial confidence in students' digital capabilities. However, the fact that this is the highest score—yet still moderate—reveals a broader concern about inconsistency in student digital readiness. Similarly, “There is a guidance manual for lecturers and students” ( $M = 3.01$ ) and “Some students have specific means to support blended learning” ( $M = 3.01$ ) reflect limited access to resources and training materials. Items such as “Blended learning reduces interaction and communication between students and faculty members” ( $M = 2.98$ ) and “Faculty members are regularly trained on blended learning techniques” ( $M = 2.95$ ) highlight concerns about weakened interpersonal engagement and the insufficiency of professional development opportunities. Additional items, including the availability of suitable programs and technologies ( $M = 2.93$ ), awareness-raising by staff ( $M = 2.92$ ), and technical supervision of tools and devices ( $M = 2.90$ ), indicate further systemic gaps in support and guidance. Most critically, “The university possesses the necessary infrastructure for quality blended learning” ( $M = 2.86$ ) received the lowest score, underscoring fundamental infrastructural deficiencies—such as inadequate digital tools, poor connectivity,

TABLE 4 The arithmetic means and standard deviations of the estimates of the study sample on the items of the first domain.

Item number	Item	Arithmetic mean*	Standard deviation	Rank	Grade
2	Blended learning motivates students toward self-directed learning	3.07	1.03	1	Moderate
13	I possess skills to work with multiple computer applications	3.05	1.02	2	Moderate
1	Students can ask any questions through blended learning process	3.03	1.07	3	Moderate
15	I can utilize non-university digital learning platforms	3.03	1.04	4	Moderate
7	Blended learning achieves intended educational goals	3.02	0.95	5	Moderate
3	Smooth transition from traditional to blended learning is possible	2.99	1.01	6	Moderate
4	The blended learning system allows students access to educational material at any time	2.99	1.02	7	Moderate
8	Blended learning contributes to the continuity of the educational system	2.95	1.04	8	Moderate
11	Blended learning increases technical and administrative burdens on instructors	2.95	1.04	9	Moderate
12	Faculty members respond to student feedback	2.95	0.96	10	Moderate
5	Blended learning contributes to understanding educational material	2.93	0.97	11	Moderate
9	Electronically used assessment methods allow lecture objectives to be achieved	2.92	1.03	12	Moderate
14	Blended learning facilitates communication between administration, faculty, and students	2.92	1.01	13	Moderate
10	Faculty members use blended learning as a suitable alternative to traditional education	2.90	1.01	14	Moderate
6	Computer-based educational material provides students with research skills	2.89	1.05	15	Moderate
	First domain: effectiveness of blended learning from the faculty members' point of view	2.97	0.46	–	Moderate

\*The lowest score (1) and the highest score (5).

TABLE 5 Arithmetic means and standard deviations of estimates from the study sample individuals on items of the second domain from the faculty members' viewpoint.

Item number	Item	Arithmetic mean	Standard deviation	Rank	Grade
2	There is no adequate training available for students to use blended learning platforms	2.97*	1.05	1	Medium
5	Lecturers provide incentives to students through the blended learning system	2.95*	1.03	2	Medium
3	Students interact with blended learning platforms	2.94*	0.99	3	Medium
1	Students accept all transitions to blended learning comfortably	2.87	1.03	4	Medium
4	Students submit educational assignments on time	2.84	1.02	5	Medium
	Second domain: students' interaction with blended learning	2.91	0.60	–	Medium

\*The lowest score (1) and the highest score (5).

and lack of maintenance—that continue to impede effective blended learning delivery. These findings emphasize the urgent need for strategic investments in infrastructure, targeted training, and equitable resource distribution to enhance the institutional readiness for blended learning in Jordanian universities.

TABLE 6 Arithmetic means and standard deviations for the estimates of the study sample individuals on the items of the third domain.

Item number	Item	Arithmetic mean	Standard deviation	Rank	Grade
9	Some students possess skills in dealing with computers and blended learning.	3.05*	1.03	1	Moderate
5	There is a guidance manual for lecturers and students on how to use the blended learning platform	3.01*	1.06	2	Moderate
8	Some students have specific means to support on blended learning	3.01*	1.04	3	Moderate
7	Blended learning reduces interaction and communication skills between students and faculty members	2.98	1.13	4	Moderate
4	Faculty members are regularly trained on using blended learning techniques	2.95	1.06	5	Moderate
2	Suitable educational programs and technologies are available for students' abilities and skills	2.93	1.09	6	Moderate
6	Lecturers and administrators always work to raise awareness of the importance of blended learning	2.92	1.01	7	Moderate
3	There are permanent supervisors for devices and tools used in blended learning	2.90	1.04	8	Moderate
1	The university has the necessary infrastructure for the quality of blended learning system	2.86	1.06	9	Moderate
	Third domain: requirements of blended learning	2.96	0.56	–	Moderate

\*The lowest score (1) and the highest score (5).

## Results of the second question

- Are there statistically significant differences at the significance level ( $\alpha = 0.05$ ) between the means of the study sample estimates for the status of blended learning in Jordanian universities from the point of view of faculty members attributed to the variables of gender and years of experience?

To answer this question, the arithmetic means and standard deviations of the study sample estimates for the current status of blended learning from the viewpoint of faculty members were calculated, according to the variables: gender and years of experience. Table 7 illustrates this.

It is noted from Table 7 that there are apparent differences between the arithmetic means of the study sample's estimates of the current status of blended learning according to the variables: gender and years of experience. To determine the statistical significance of these apparent differences, a two-way analysis of variance was applied, and (Table 8) shows this.

From Table 8, researchers observed the following:

There is no statistically significant difference at the significance level ( $\alpha = 0.05$ ) between the mean estimates of the study sample for the current status of blended learning (overall) according to the gender variable. Similarly, there is no statistically significant difference at the significance level ( $\alpha = 0.05$ ) between the mean estimates of the study sample for the current status of blended learning from the viewpoint of faculty members (overall) according to the variable of years of experience.

The arithmetic means and standard deviations of the study sample's estimates were calculated for each domain of

the current status of blended learning according to gender and years of experience variables. This is illustrated in Table 9.

Table 9 reveals apparent differences in the arithmetic means of the estimates of the study sample on each domain of blended learning from the perspective of faculty members, according to the impact of gender and years of experience variables. To determine the statistical significance of these apparent differences, a multivariate analysis of variance was conducted, as shown in Table 10.

It is observed From Table 10 that:

- There is no statistically significant difference at the level of ( $\alpha = 0.05$ ) in all domains of blended learning from the viewpoint of faculty members (overall) based on the gender variable.
- There is also no statistically significant difference at the level of ( $\alpha = 0.05$ ) in all domains of blended learning from the viewpoint of faculty members (overall) based on the years of experience variable.

## Discussion of results

### Discussion of the results of the first question

What is the current status of blended learning in Jordanian universities from the viewpoint of faculty members?

**TABLE 7** Arithmetic means and standard deviations of study sample estimates for the current status of blended learning from faculty members point of view according to gender and years of experience.

Variable	Level/category	Arithmetic mean	Number	Standard deviation
Gender	Male	2.97	210	0.400
	Female	2.93	187	0.497
	Total	2.95	397	0.448
Years of experience	1–10 years	2.94	210	0.460
	11–20 years	2.96	143	0.369
	21 years or more	2.95	44	0.608
	Total	2.95	397	0.448

**TABLE 8** Two-way analysis of variance for the arithmetic means between the estimates of the study sample for the current status of blended learning according to variables: gender, and years of experience.

Variable	Sum of squares	Degrees of freedom	Mean square	F value	Significance
Gender	0.012	1	0.012	0.059	0.809
Years of experience	0.350	2	0.175	0.875*	0.418
Error	75.761	379	0.200	–	–
Total	3531.073	397	–	–	–
Corrected total	79.512	396	–	–	–

\*Statistically significant at the level of significance ( $\alpha = 0.05$ ).

**TABLE 9** Arithmetic means and standard deviations of estimates of study sample according to gender and years of experience variables.

Variables	Categories	Statistical	Domain1: effectiveness of blended learning	Domain2: students' interaction with blended learning	Domain requirements blended learning	3: of
Gender	Male	Mean	2.99	2.96	2.96	
		Number	56	56	56	
		Standard dev.	0.416	0.574	0.533	
	Female	Mean	2.96	2.86	2.96	
		Number	75	75	75	
		standard dev.	0.504	0.630	0.596	
Years of service	Total	Mean	2.97	2.91	2.96	
		Number	131	131	131	
		Standard dev.	0.459	0.603	0.563	
	1–10 years	Mean	2.94	2.96	2.93	
		Number	48	48	48	
		Standard dev.	0.448	0.638	0.548	
	11–20 years	Mean	3.01	2.86	3.00	
		Number	66	66	66	
		Standard dev.	0.403	0.510	0.517	
	21 years or more	Mean	3.04	2.86	2.95	
		Number	17	17	17	
		Standard dev.	0.644	0.695	0.751	
	Total	Mean	2.97	2.91	2.96	
		Number	131	131	131	
		Standard dev.	0.459	0.603	0.563	

TABLE 10 Multivariate analysis of variance (MANOVA) for the mean estimates of the study sample individuals across each domain, according to the variables: gender, and years of experience.

Source of variation	Domain	Sum of squares	Degrees of freedom	Mean square	F value	Statistical significance
GenderHotelling's Trace = 0.012 Sig. = 0.229	Effectiveness of blended learning	0.000	1	0.000	0.001	0.972
	Student interaction with blended learning	0.160	1	0.160	0.445	0.505
	Blended learning requirements	0.549	1	0.549	1.763*	0.185
Years of experience Hotelling's trace = 0.010 Sig. = 0.688	Effectiveness of blended learning	0.315	2	0.157	0.748	0.474
	Student interaction with blended learning	0.780	2	0.390	1.086*	0.339
	Blended learning requirements	0.288	2	0.144	0.463	0.630
Error	Effectiveness of blended learning	79.746	379	0.210	–	–
	Student interaction with blended learning	136.202	379	0.359	–	–
	Blended learning requirements	117.955	379	0.311	–	–
Total	Effectiveness of blended learning	3592.822	397	–	–	–
	Student interaction with blended learning	3516.880	397	–	–	–
	Blended learning requirements	3598.494	397	–	–	–
Mean total	Effectiveness of blended learning	83.536	396	–	–	–
	Student interaction with blended learning	143.802	396	–	–	–
	Blended learning requirements	125.451	396	–	–	–

\*Statistically significant at the level ( $\alpha = 0.05$ ).

The results indicated that the arithmetic means of the domains of blended learning from the viewpoint of faculty members ranged between 2.91 and 2.97, reflecting an overall moderate level of perception. The first domain, *effectiveness of blended learning*, ranked highest ( $M = 2.97$ ), suggesting that faculty recognize the potential of blended learning in enhancing educational processes, albeit within current limitations. The lowest-rated domain was *students' interaction with blended learning* ( $M = 2.91$ ), indicating concerns over student engagement and digital readiness. This moderate assessment across all domains is consistent with several previous studies conducted in similar contexts, including Fayyoubi et al. (2021), Almousa et al. (2023), which also found that faculty satisfaction with blended learning implementation in Jordan is limited by infrastructural and pedagogical constraints.

The observed results can be attributed to multiple factors such as inadequate infrastructure, limited access to digital devices, outdated educational platforms, and insufficient institutional support. These findings mirror the observations of Abu Shkheidem et al. (2020), Nasrallah (2021), who reported

similar implementation barriers in their studies. However, they contrast with the more favorable findings of Al-Zahrani (2021), Paulsen (2009), where higher satisfaction levels were recorded. A plausible reason for this divergence may lie in differences in technological infrastructure and institutional investment. For example, institutions in the Al-Zahrani study may have had more robust e-learning systems and faculty training programs, contributing to more positive faculty perceptions.

### Discussion of the first domain: effectiveness of blended learning from the point of view of faculty members

The results showed that item means ranged from 2.89 to 3.07, with the highest rating assigned to "*Blended learning encourages students toward self-learning*" ( $M = 3.07$ ). This suggests that faculty see blended learning as a potential tool for fostering independent learning—consistent with findings from Al-Momani

(2021), Benaichi and Benachi (2018). However, the lowest-rated item, “Computerized instructional material provides students with research skills” ( $M = 2.89$ ), reflects a perceived deficiency in the depth and quality of digital content. This aligns with Al-Fawara (2021), who similarly highlighted gaps in content quality, but diverges from Al-Zahrani (2021), who found stronger support for the role of blended materials in developing higher-order skills. These differences may be attributed to variations in how digital content is curated and deployed across institutions.

## Discussion of the second domain: students’ interaction with blended learning

Item scores ranged between 2.84 and 2.97, with the highest being “There is no appropriate training available for students to use blended learning platforms” ( $M = 2.97$ ). This confirms a lack of sufficient orientation or support for students, which may hinder their effective participation. The lowest-rated item, “Students submit required educational assignments on time” ( $M = 2.84$ ), reflects possible time management or platform usability issues. These findings are consistent with Shdeifat and Zoub (2020) and Abu Jarad (2021), who identified student readiness and motivation as key barriers to successful blended learning. By contrast, Draissi and Yong (2020) reported more positive student interaction, possibly due to more developed institutional frameworks in their study context. The variation suggests that implementation quality and support systems directly affect engagement levels.

## Discussion of the third domain: requirements of blended learning

In this domain, item scores ranged from 2.86 to 3.05. The highest-rated item was “Some students possess skills in dealing with computers and blended learning” ( $M = 3.05$ ), indicating variability in students’ digital competencies. This supports the notion of a digital divide, where some students are well-prepared while others lag behind—a concern raised by Goosen and Heerden (2017). The lowest-rated item, “The university possesses the necessary infrastructure for quality blended learning” ( $M = 2.86$ ), highlights a significant barrier to effective implementation. This is consistent with Al-Muqrin (2019) and Nasrallah (2021), who emphasized that limited infrastructure remains a persistent obstacle in Jordanian universities. The discrepancy with Wadi (2019), who reported higher institutional readiness, may reflect different institutional contexts or more recent investments in digital transformation at certain universities.

Overall, the moderate ratings across all domains and items suggest that while blended learning is conceptually accepted by faculty, its practical implementation remains constrained. Factors such as inconsistent training, technological inequities, and limited digital fluency among students likely contribute to these perceptions. Moreover, the absence of structured institutional policies and real-time technical support further hampers blended learning success. These findings underscore the urgent need for strategic investments, targeted training programs,

and comprehensive support systems to ensure the long-term sustainability and effectiveness of blended learning initiatives.

## Conclusion

The study assessed the current status of blended learning from the perspective of faculty members in Jordanian universities, finding an overall moderate level of satisfaction across all domains. The domain of *effectiveness of blended learning* ranked highest ( $M = 2.97$ ), suggesting that faculty members recognize its potential to enhance teaching and learning. In contrast, *student interaction* was rated lowest ( $M = 2.91$ ), reflecting concerns about engagement and digital readiness. These moderate ratings indicate the presence of significant challenges, including inadequate infrastructure, limited access to computers, outdated software, complex communication channels, and insufficient technical support and maintenance. The reduced interaction score may also reflect a perceived diminishing of faculty’s traditional educational roles in blended environments, as echoed in prior research (Nasrallah, 2021; Abu Jarad, 2021; Al-Fawara, 2021), though it contrasts with more favorable outcomes reported by Al-Zahrani (2021), Paulsen (2009).

Within the *effectiveness* domain, faculty members particularly acknowledged blended learning’s role in fostering self-directed learning (mean = 3.07). However, they also highlighted a lack of computerized instructional materials that promote research skills (mean = 2.89). In the *student interaction* domain, insufficient student training on how to use blended learning platforms emerged as the most pressing issue (mean = 2.97), while timely submission of assignments was rated the lowest (mean = 2.84). Regarding the *requirements for blended learning*, students’ digital competencies received the highest rating (mean = 3.05), whereas institutional infrastructure—a foundational element for successful blended learning—was rated the lowest (mean = 2.86).

No statistically significant differences were found based on gender or years of experience, suggesting that faculty perceptions of blended learning were broadly consistent across demographic variables. This result aligns with the findings of Al-Fawara (2021), Al-Mashharawi (2020), but diverges from those of Gharaibeh (2022), Nasrallah (2021), who reported variability influenced by these factors.

This study provides new insights by capturing faculty perceptions from three distinct university settings—public, applied, and private—thereby addressing a notable gap in the literature, which often focuses narrowly on single institutions or student perspectives. It adds empirical weight to regional concerns about infrastructure and pedagogical readiness for blended learning, while also offering a multi-institutional, faculty-centered perspective that is essential for informing future policies and reforms.

Furthermore, the study identifies specific gaps in both technological readiness and instructional support, highlighting areas such as student training, faculty development, and content enhancement as priorities. These findings underscore the need for strategic investments, capacity building, and inclusive digital policies to ensure the sustainability and effectiveness of blended learning programs. The results serve as a valuable reference for

higher education leaders, policymakers, and instructional designers seeking to strengthen blended learning frameworks in Jordan and similar developing contexts.

## Terminological and procedural definitions

**Blended Learning:** Defined by Al-Zwaini and Al-Asadi (2016, 5) as: “An attempt to communicate and interact between the lecturer and the learner remotely, regardless of time and place, through educational or training programs, such as remote conferences, the internet, learning platforms, computers, television channels, email, and others.”

**Procedurally,** it is defined as: Delivering specific educational materials to the student through interactive platforms, electronic networks, computers, and smartphones, allowing the learner to access these materials and information anytime and anywhere. It is measured by the degree to which university faculty members and students (2023–2024) respond to the specified questionnaire, which includes a set of ideas, opinions, and beliefs held by faculty members or students about the implementation and development of blended learning skills. These are formed through their various experiences.

**Faculty Members:** “Full-time lecturers who regularly teach specific courses or subjects at universities to enable students to acquire specialized skills and obtain a bachelor’s or postgraduate degree. They conduct peer-reviewed scientific research published in international research journals, hold a doctoral degree or professorship, and are characterized by diligence, striving for excellence, social workability, communication skills, problem-solving abilities, decision-making skills, and time management” (Husseini, 2023, 16).

**Procedurally,** they are defined as: Regular lecturers teaching specific courses or subjects at universities to enable students to acquire specialized skills and obtain a bachelor’s or postgraduate degree. They will be subject to responding to a questionnaire focused on the current status of blended learning in Jordanian universities from the viewpoint of faculty members, developed by researchers.

## Firstly: study limitations

This study was conducted on faculty members in Jordanian governmental and private universities during the academic year (2023–2024). There are (10) governmental universities and (18) private universities in Jordan. The study was applied to a simple random sample consisting of (131) faculty members at the University of Jordan, Al-Balqa Applied University, and Amman Arab University.

## Secondly: study delimitations

The study’s findings are applicable only to faculty members in Jordanian universities. The generalization of the results depends on the validity and reliability of the research tools utilized in this

study. Therefore, it cannot be assured that identical results would be obtained if different research tools were employed.

## Recommendations

In light of the findings, several practical and research-oriented recommendations are proposed to support the effective implementation and development of blended learning in Jordanian universities. At the institutional level, there is an urgent need to provide structured and ongoing training programs for both faculty members and students. These should focus on enhancing digital literacy, familiarizing users with learning management systems, and introducing best practices for engaging in blended learning environments. Training initiatives must be tiered to accommodate varying levels of technical proficiency and should include practical, hands-on components.

Furthermore, universities should adopt clear institutional policies that embed blended learning within curriculum design and instructional delivery. This should be supported by frameworks that promote alignment with national higher education goals and digital transformation agendas. Equally important is the development of mechanisms to monitor and support the performance of faculty members engaged in blended teaching. Institutions are encouraged to implement regular professional follow-up processes, including feedback systems, peer review, and goal-based evaluations that assess pedagogical effectiveness and instructional innovation.

Another critical recommendation is the enhancement of digital infrastructure. Universities must invest in improving internet connectivity, upgrading computer labs, and ensuring access to modern educational technologies across all campuses. Attention should be paid to underserved areas and institutions to promote equity in access to blended learning tools. In addition, universities should establish student-centered support services such as digital helpdesks, orientation programs for online platforms, and academic advising tailored to online learning skills such as time management and self-directed study.

In terms of future research, several areas warrant further exploration to build on the current findings. First, longitudinal studies are needed to track how faculty and student perceptions of blended learning evolve over time, particularly in response to institutional reforms and technological improvements. Researchers should also explore how blended learning outcomes vary across academic disciplines, as instructional needs and teaching methodologies may differ significantly between fields such as the humanities, sciences, and applied studies.

Additionally, further studies should focus on students’ perspectives, especially across diverse socio-economic backgrounds and geographic regions, to better understand digital access, engagement, and learning equity. Mixed-method and experimental research designs are also recommended to evaluate the specific impact of instructional strategies—such as flipped classrooms or hybrid assessments—on academic performance and learning outcomes. Finally, there is a need to investigate the influence of institutional leadership, organizational culture, and policy support on faculty adoption of blended learning models. Understanding

the motivational and structural factors that encourage or hinder innovation will be essential for sustaining blended learning practices in higher education.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

All research protocols and procedures in this study were reviewed and approved by the Committee on the Ethics of Amman Arab University, Jordan. The study received formal approval under the reference number FW2024-101523. Prior to participation, all individuals were informed of the study's objectives, procedures, potential risks, and their rights, including the right to withdraw at any stage without penalty. Written informed consent was obtained from all participants. The study ensured full confidentiality and anonymity of all participant data, which was securely stored and used exclusively for academic research purposes. No procedures were conducted that could cause physical or psychological harm, and all necessary measures were taken to safeguard participants' privacy, dignity, and welfare.

## Author contributions

KA: Conceptualization, Methodology, Writing – original draft. NA: Conceptualization, Methodology, Writing – original

draft, Resources. BY: Supervision, Validation, Writing – review and editing.

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